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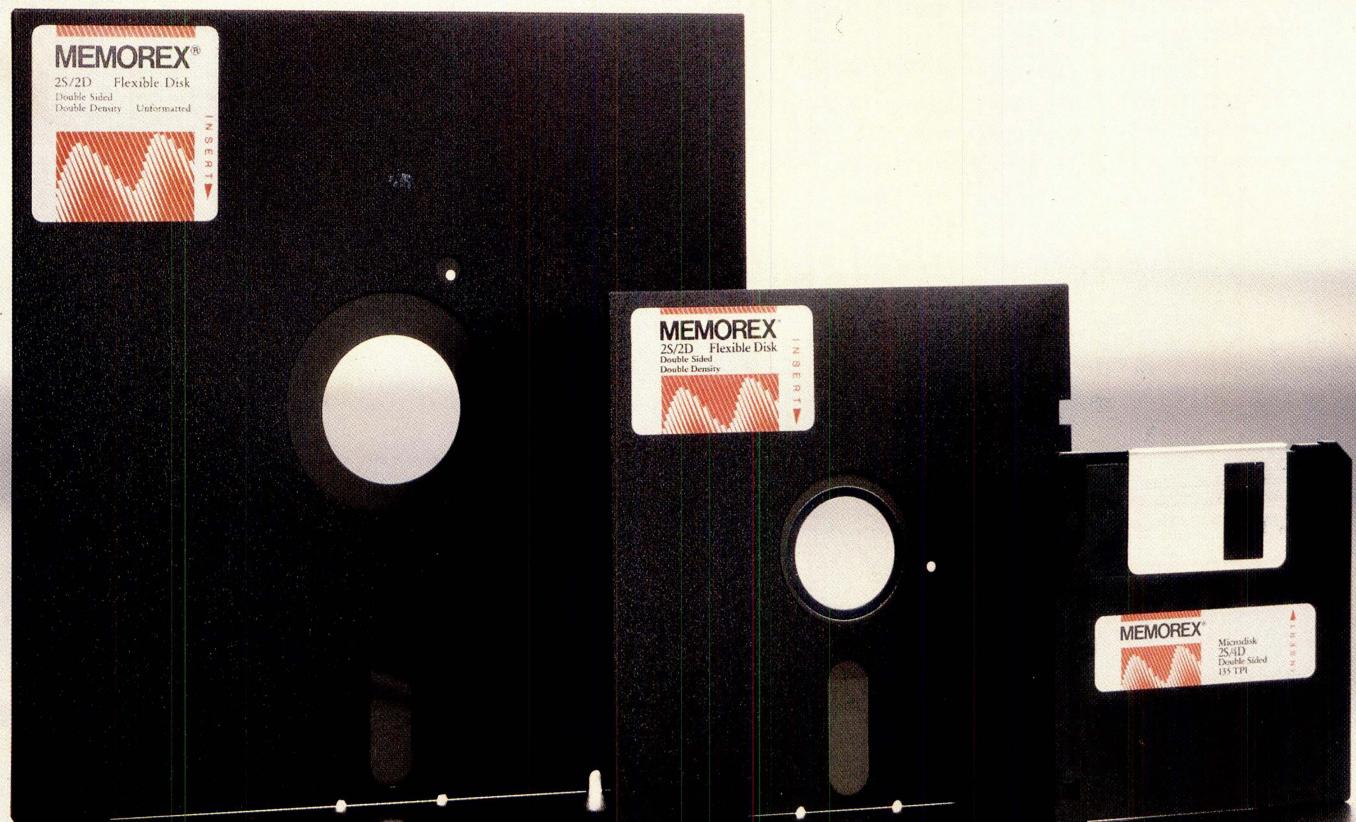


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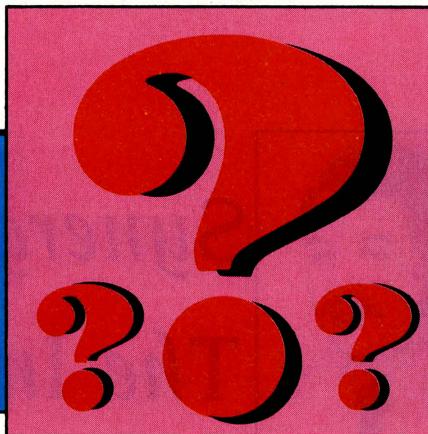
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EDITORIAL



Synergism In The Industry

People often ask me what on earth Synergistic Beer Drinking means. They understand the beer drinking part (people who've known me for a while understand it only too well), but this synergism thing has got them puzzled.

Synergism is that property of a system by which the whole is greater than the sum of its parts. Many systems exhibit this property: UNIX devotees, for example, claim that operating system to be a prime example of synergism. By combining lots of simple programs in pipes and shell scripts, extremely sophisticated effects can be achieved.

Likewise, when YC's readers get together, the effect of their combined intellects is greater than their individual efforts. They also seem to be able to drink a lot more (to be fair, this observation applies to a major part of the computer industry).

Synergism applies not just to the people in the industry, but also to the products: the machines and the software. The astonishing success of the IBM PC architecture, for example, can be primarily attributed to the fact that IBM encourages software and hardware developers to construct systems out of it; the combination of the bare IBM box and a third-party board, for example, is more powerful than either could achieve by its own efforts.

Smart marketers are aware of the power of synergism and encourage it. However, others seem to regard it as a danger, and a few are even designing their products to make synergistic combinations impossible.

I've recently been told, for example, that Microsoft has modified some of its products to detect whether they are running under the Concurrent DOS operating system and, if so, refuse to run. Microsoft's reason for doing this is not clear, but presumably it wishes to ensure Digital Research does not gain a foothold in the PC operating system market.

This is strange: Microsoft totally dominates

the market and will not lose sales to Concurrent. Virtually every system with Concurrent DOS boots into MS-DOS or PC-DOS first. In any case, very few PC owners run Concurrent — one per cent would be a generous estimate. Those that do generally have some need for it, otherwise they would not persevere with what is, by comparison with PC-DOS, a large, cumbersome, slow and complex operating system. By stopping its products from running under Concurrent, Microsoft is simply frustrating a few users and doing harm to its image.

IBM has fallen prey to the same thinking. A few intrepid users of the IBM PC AT had worked out that by replacing the clock crystal on the system board, the AT's speed could be upped from 6 MHz to 8 MHz, providing a speed improvement of 33 per cent. Worth having, albeit at the risk of some potential compatibility problems.

On discovering this, IBM modified the BIOS of the AT to include a clock-speed test. New ATs will not run if the clock speed has been changed.

Again, some consumers' need for improved performance or functionality has been thwarted by reverse engineering. The synergistic effect of a post-purchase modification has been disallowed. IBM would doubtless say that unauthorised modifications make service by IBM staff difficult, void the warranty and impose an extra workload on support staff who have to track down compatibility problems. But surely that is the owner's problem, the owner's right, and the owner's responsibility?

Apart from the threat to innovation these moves represent (and the fact the synergistic effects which distinguish the PC industry from the rest of the computer industry are no longer possible), serious concerns must arise about the user's right to do as he or she likes with the equipment purchased. □

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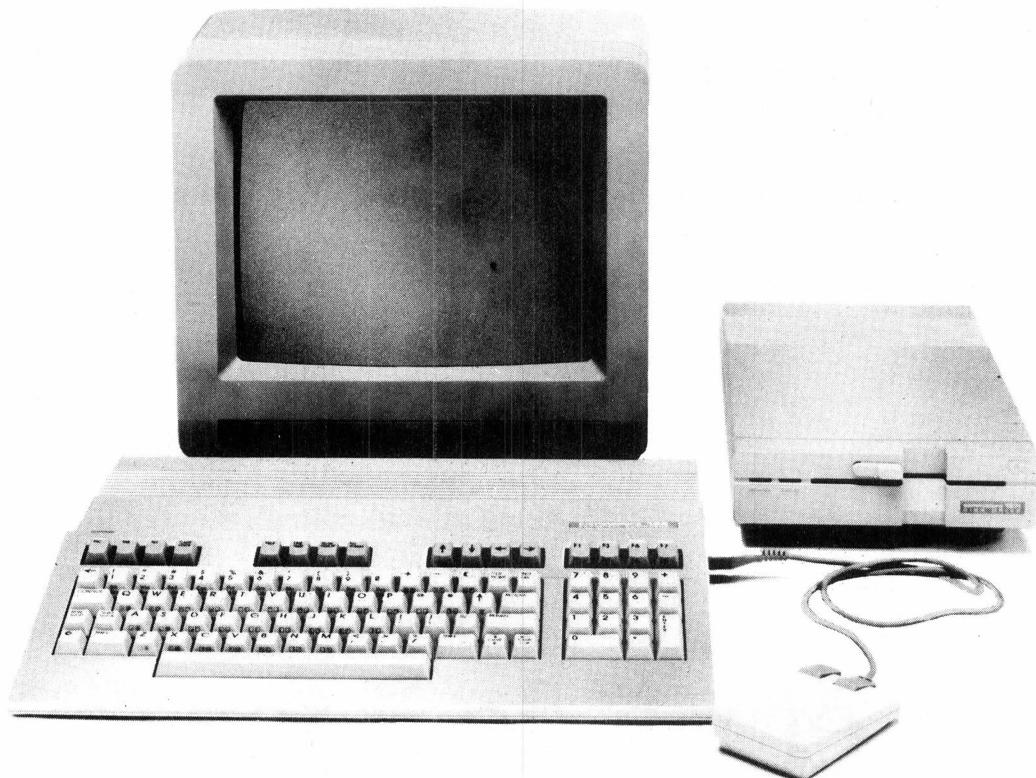
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...so powerful, it's 3 computers in 1



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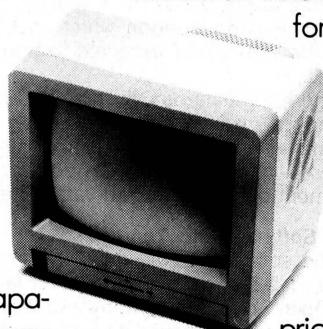
even have to use the keyboard to get your Commodore 128 working. The Mouse serves as a pointer and input device in conjunction with programs like Jane, to let you move words, draw pictures and issue commands.

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High speed dot matrix printer gives you 100 cps to draft reports, 40 cps in Near Letter Quality mode. 80 columns wide

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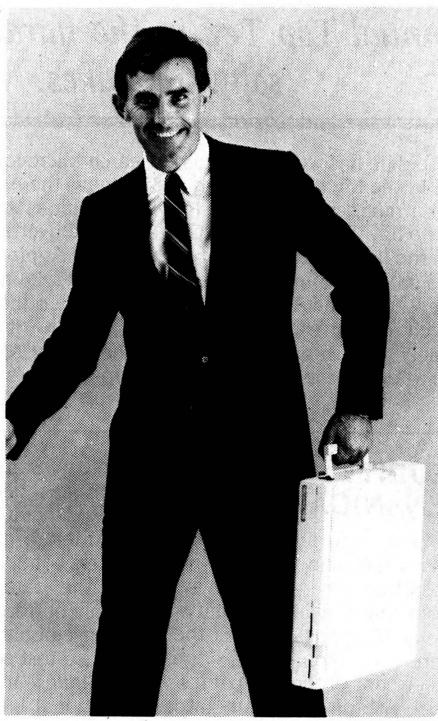
256/512K Expansion Cartridge gives you power to spare to run the big software packages or write your own programs.

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Simply snap the keyboard onto this great new computer and grab the carry handle to take the new 128D transportable anywhere work or play takes you.

Weighs around 8kg, and shares all the 128's features, including 512K expandability.

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gives you the power!

TEAM 2660YC

THE YEAR'S BESTSELLERS

Getting sales figures from computer software and hardware manufacturers and distributors is notoriously difficult, making analysis of the market a mixture of detective work, rumour-sifting, and guesswork. Focus Research introduced Micro Scoreboard to make such analysis somewhat more accurate. Focus tracks invoiced sales of micros and personal computers with a list price of \$1000 and over — plus related software — through third-party channels, and produces an annual Top Ten in the hardware and software stakes.

The Apple IIe has won the Focus Research Microcomputer of the Year award. In the Micro Scoreboard 1985 review, the Apple IIe was placed first in a microcomputer top 10 which includes Apple's own Macintosh, the IBM PC, the NEC APC III and the Olivetti M24. According to Focus, the IIe represented 41 per cent of all Apple sales in 1985, with the Macintosh selling 31 per cent and the IIC 28 per cent.

"The IIe remains Apple's most successful product ever," said Focus Research executive director Jennifer Adelstein. "It is known to be an extremely reliable machine and, fortunately for Apple, its clones are known to be unreliable." A major factor in the IIe's continued success

was its large installed base, with schools which already have a number of them unlikely to purchase extra machines that are not Apple IIs.

According to Adelstein, another reason for the high third-party sales is that, unlike some other vendors, Apple is rarely in conflict with its dealers: "It sells all its product through them and it doesn't try to underbid with direct supply. This goes against the current trend which sees more vendors selling directly to the market. The fight for a dealer's shelf space is becoming extremely intense, and retaining market share depends on dealer loyalty."

Many dealers have said the IIe virtually sells itself by its mere presence in a store. The same cannot be said of the IIC, which performed weakly over the Christmas period despite concentrated marketing activity. The IIC figures in the top 10 on the strength of its first-quarter performance, which was due to the carry-over effect of its 1984 Christmas marketing.

The complete Micro Scoreboard Top Ten listing is: Apple IIe, IBM PC, Apple Macintosh, NEC APC III, IBM PC/XT, Apple IIC, Olivetti M24, Hewlett-Packard 150, Wang Professional and the IBM PC/AT.

The NEC APC III has now moved into a position where it is challenging the PC/XT as the top-selling hard-disk system. The Software Library Expander option, which enables NEC users to run most popular IBM software, is expected to boost the machine's 1986 sales volumes.

The high margins Olivetti offers its dealers on the M24 have encouraged many of them to actively promote it and offer hefty discounts — just have a look at advertisements in the papers and magazines — and the machine is popular with universities, colleges, government departments and various vertical markets.

The Software Top Ten

In the software arena, the Top Ten list for 1985 was: Appleworks, Lotus 1-2-3, Multimate, Microsoft Word, Multiplan, Wordstar, dBase III, Open Access, Symphony and Wordperfect.

Appleworks achieved its position through bundling with the IIe and IIC. The top-selling machine-independent product, for every month but one, was Lotus. This was ousted in December by Multimate and Excel, with Excel selling 700 units in December alone, only three months after its release.

Multimate was the highest selling of the four word processing pack-

SECURITY SHENANIGANS

While many software companies have a propensity to 'pre-announce' products — often leaving consumers waiting months for the actual appearance of the software — sometimes the delays are not of the companies' making. Ashton-Tate ran into this problem when it released dBase III Plus, complete with a new software protection program to prevent people from making copies of the software.

The culprit in this case was the

United States Government, which has decided to make it more difficult for Eastern bloc countries to grab its technology 'secrets'. The 'secret' in question was the data encryption algorithm, not dBase III Plus itself. An export embargo has been placed on the latest software encryption techniques, and both Borland International and Ashton-Tate have found their products restricted for sale to the United States and Canada.

When Ashton-Tate produced dBase III Plus, it had the choice of producing a 64-bit encryption

version for the United States (the latest protection technique) and a 32-bit version for export, or alternatively, producing a compromise version for both markets. The problem with the 32-bit version is it is fairly easy to break, so Ashton-Tate opted for the latter choice, producing a compromise version which conforms to the American Defence Agency's restrictions of being able to be broken within two hours on a Cray II supercomputer.

One wonders how effective such an export embargo can be, when any 'Eastern bloc agent'

can walk into their local United States computer shop and buy the software on the spot. □

OSBORNE DUMPS CP/M

Osborne USA is moving to close down its 8-bit CP/M division, based in Fremont, California. At the same time, the company is planning to merge with two OEMs (original equipment manufacturers), Tigermark Corporation and Colby Engineering, to promote its full-time involvement in the 16- and 32-



Focus Research executive director, Adrian Wood (left), presents David Strong, managing director of Apple Computer Australia, with the Micro Storeboard award for the top-selling personal computer of 1985, the Apple IIe.

ages on the list. Once selling on par with the veteran Wordstar, it is now followed closely by Microsoft Word. According to Jo-Ann Booth, a consultant with Focus, Wordstar no longer has a firm hold on the word processing market. "Its sales are expected to fall away in 1986, and with at least three other very strong word processing packages available it seems to be in decline."

Ms Booth also believes Ashton-Tate's dominance of the database market, established with dBase II and III, will be consolidated with the just-released dBase III Plus.

In the integrated software stakes, Symphony's stablemate Jazz has failed to impress the market. "Jazz was pre-announced too forcefully and eventually hit the market at a time when Mac users were anxiously awaiting Excel," said Booth. "Jazz just arrived too late."

Overall, Booth said 1986 could see as much as an 85 per cent

growth in PC software volume. "Last year was a year of consolidation for many users; this year we'll see people buying their second or third packages, which will account for a large part of this growth figure."

Market Roundup

Ms Adelstein said that if the business market is competitive, the education market is no less so: "And Apple's big user base is a definite head start. The Apple user groups are very active in schools, the programs are not hard to write, there is a lot of documentation and the machines are easy to use."

"This award means that, apart from the IIe, no other machine in its class sold 10,000 units or more through dealers in 1985. This shows how fragmented the market is in Australia, and how conservative our users are; they stick to a machine they know and respect." □

bit markets.

Tigermark manufactures add-on boards and peripherals for 16- and 32-bit OEM companies, Colby, which used to concentrate on the heavy engineering and military markets, recently announced a 32-bit portable Apple Macintosh clone. The newly formed United States company, which will continue to trade under the Osborne name, will concentrate on developing 16- and 32-bit architecture and producing peripherals and add-ons.

Osborne Australia's managing

director, Stanley Falinski, says the 8-bit closure in the United States will have no effect on Osborne's Australian operation. Good news for local Osborne 8-biters? No. As Falinski says, Osborne Australia effectively abandoned CP/M some time ago, deciding to concentrate on 16-bit DOS architecture.

Osborne Australia has pledged to provide 8-bit Osborne users with the same level of support given to 16-bit users. If it does, it will be one of the few computer companies to continue to support discontinued lines. □

SOFTWARE ENGINEERING CONFERENCE

A major conference on software engineering, the first of its kind in Australasia, will be held in Canberra from May 14 to 16 this year.

'Software Engineering — Path to Computer Systems Reliability' will be the theme for the three-day event which has attracted a number of international speakers. Keynote speaker is Professor David Parnas from the University of Victoria in Canada. Professor

Parnas is known for his involvement in the on-going debate on the feasibility of the Strategic Software Initiative, part of the United States 'Star Wars' research programme.

During his visit to Canberra, Professor Parnas will give a free public lecture, scheduled for 6 pm on Tuesday May 14 at the Academy of Science, on 'Why Strategic Defence Software must be Untrustworthy'.

Sponsored by the Institution of Engineers Australia, in conjunction with the Australian Computer Society and the Insti-

Rise and Fall

*Most of us learned to live
with the old A>, and
eventually found ourselves
becoming quite fond of it,
in a perverse
self-punishing way.*

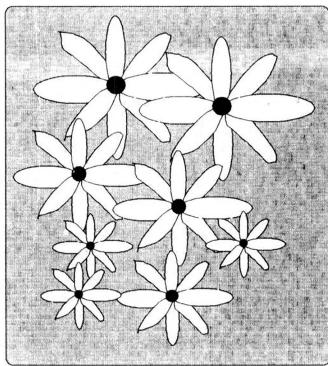


Figure 5.

520ST, GEM has been implemented for MS/PC-DOS machines, along with a version for such computers as the Apricot and certain Olivetti machines. A 68000 version, known as GEM DOS, has also been released. According to the UK weekly trade magazine, *Microscope*, reports from the US say Digital Research is considering GEM DOS versions for the Amiga and — wait for it — the Macintosh. It is generally conceded that a Mac implementation would be more of a publicity stunt than a real product, but DRI might see it as worth it, just to see Steve Jobs squirm even more.

So there you have it. A chance for the rest of us to get involved in the world of mice and icons. Although A> still lives on as old software in new bottles, more and more GEM-based software will emerge which, like DRI's own Draw, will have never even said hello to A>. Draw cannot be invoked from A>ville, and it cannot take you there. As more and more software developers start their work with GEM rather

than tacking it on afterwards, A> and its aggressive cousins will fade into history.

Whether you run the GEM environment on an Atari, a machine running MS-DOS or PC-DOS, or something else, it doesn't matter. At heart GEM is GEM (although specific implementations, like that for the 520ST, provide additional goodies such as a 'control panel', which does not appear on the original 8086 version for the IBM PC). You'll find once you know how to operate it, you won't even have to know which computer you're working with.

Remember, mighty GEMs from tiny icons grow.

Tim Hartnell is the author of many popular computer books. His work on GEM, *Harnessing the Power of GEM*, will be published by Interface Publications/Pitman this month. Tim would like to acknowledge the help given to him by Sue and Barry of Arcom Pacific (the Australian agent for GEM) in getting to grips with the program. □

EDD Version 4 is the most powerful copy program available for backing up "uncopyable" or "copy-protected" disks. ■ In addition to backing up disks, **EDD 4** also features a hi-resolution graphic DISK SCAN option to help you locate information on a disk, a CERTIFY DISK option for certifying blank disks, and since it's very important that your disk drives are running properly (especially when copying disks), we have also included an EXAMINE DISK DRIVE option. ■ Even though **EDD 4** has been preset to copy the broadest range of copy-protections possible, **EDD 4** can be "modified" to back up almost any disk that runs on your Apple! ■ For the dedicated user, in addition to **EDD 4**, we are offering an **EDD 4 PLUS** version that includes a specially designed hardware card which allows **EDD** to copy EVERY bit of information from each track accurately! You can bet that if **EDD 4 PLUS** can't copy it nothing will! ■ **EDD 4** runs on an Apple II, II Plus (including most compatibles, Ile, IIc, and III (using emulation mode), and is priced at \$105.00. ■ **EDD 4 PLUS** runs on Apple II, II Plus (including most compatibles), and Ile, and is priced at \$165.00. ■ Mastercard and bankcard orders can be made by phone. All orders must be prepaid. ■ If you have an earlier version of **EDD**, you can update to **EDD 4** or **EDD 4 PLUS** at a reduced price. Send your **EDD** disk to us, and deduct \$35 from your order.

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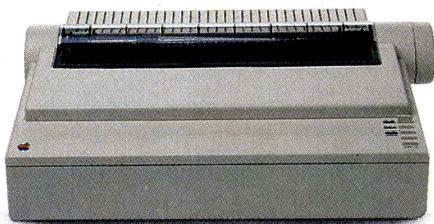
everything except complications.

And it maintains this fidelity on copy paper, letterhead, labels, envelopes or overhead transparencies.



LaserWriter Plus has 35 different typefaces built in, a choice that would embarrass your local printer (and his invoices).

But if you don't need publication-quality printing, you can have near letter-quality by teaming up your Macintosh with the ImageWriter II.



It prints in three different modes: high-quality, standard and draft. And churns it out at speeds of up to 2½ pages per minute.

You can feed in single sheets automatically with the optional SheetFeeder.

And print up to seven colours using appropriate software.

ImageWriter II can also be shared with other Macintosh users via AppleTalk.

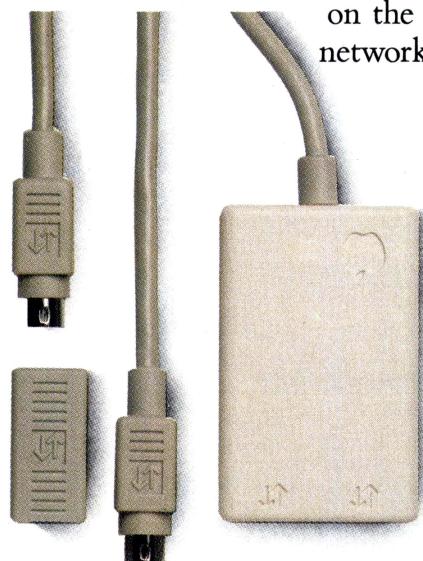
But this Macintosh isn't called Plus for nothing. You can just add and add.

Items like an AppleTalk Personal Network.

It's the most flexible, low-cost, easy-to-set-up, easy-to-use network around.

It'll connect up an office full of Macintoshes, LaserWriters, ImageWriters and file and disk servers - 32 devices in all.

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Add an Apple Modem 1200 to your Macintosh and you can talk to anyone virtually anywhere.

With a communications program like MacTerminal, a standard telephone and an Apple

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If you already own a Macintosh, there's another plus.

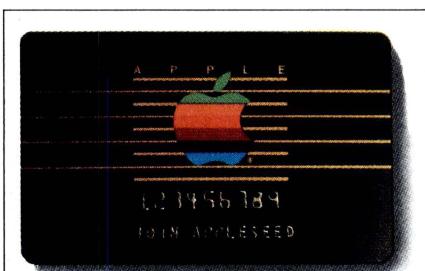
You can upgrade your machine to the new one megabyte. Ask your dealer for upgrade details.

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Get hands-on with the new Macintosh Plus.

You should like it.

You helped design it.



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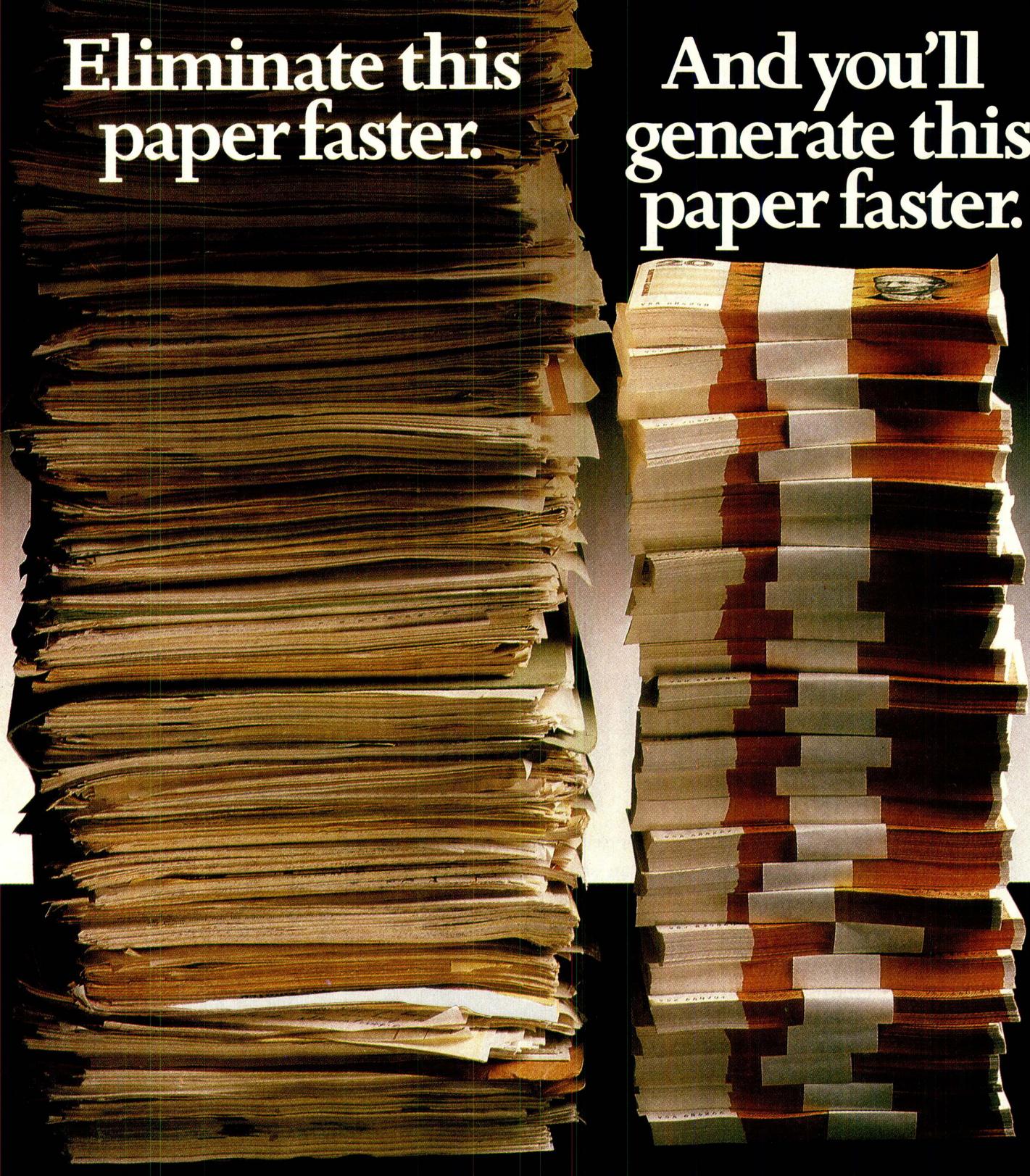
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NEWS

tution of Radio and Electronics Engineers Australia, the conference will be held in Australia's newest tertiary institution, the Australian Defence Force Academy. It is hoped it will provide an opportunity for practitioners and researchers of software engineering to interact and explore possible means of co-operation.

Some of the subjects scheduled for debate are: formal specification methods, software testing in a large-scale project environment, the new Ada language and programming support environments, and automation in software validation testings. Half-day workshops and technical tours will be held on the first day, followed by the presentation and discussion of papers.

Further information on the conference can be obtained from the Conference Department, the Institution of Engineers, 11 National Circuit, Barton 2600. □

APPLE BUYS A CRAY

Apple Computer (United States) has bought a Cray X-MP/48 supercomputer for use in simulating future hardware and software architectures and to accelerate new product development. The computer is valued at \$US14.5 million.

"In order for us to remain a technology leader in the personal computer industry, we must be willing to make significant investments in research and development," said Delbert W. Yocam, Apple's Executive Vice President of Product Operations. "With the Cray supercomputer and its powerful simulation capabilities, we will be able to evaluate a greater variety of future product directions, which will help us continue to bring revolutionary products to the marketplace." □

LOTUS TO SUPPORT WINDOWS

Lotus Development Corporation has announced it will support Microsoft's recently released (and long, long awaited) Windows operating environment by developing future applications that utilise Windows' graphics interface.

Microsoft demonstrated Win-

dows in Australia for the first time in February this year, about 18 months after it was first announced. According to Linda Graham of Microsoft Australia, Windows was ready for marketing at the time of the original announcement, but after Bill Gates, founder and chairman of the company, had a look at the product, he demanded it be rewritten.

What Windows does is to provide a clear graphic interface to DOS and applications running under DOS. It's based on the familiar Macintosh imagery of icons, scroll bars and menus, and Microsoft hopes it will develop into a standard interface for DOS applications developers.

Lotus chairman, Mitchell Kapor, said of his company's decision to use Windows: "We believe in graphical user interfaces for many of our future applications. We are already developing entire new families of products which take advantage of Microsoft Windows. It's important to emphasise, however, that we will continue to support and enhance character-based interfaces for our existing products, as well as for some future products not yet announced." □

CALL FOR FREE EFT MARKET

Austnet, Australia's largest independent operator of electronic funds transfer systems, has launched a public campaign calling for a free market in electronic funds transfers at retail outlets.

Terry McManus, managing director of Austnet, says: "The future of electronic funds transfer at point of sale (EFTPOS) is being jeopardised by a couple of old banks who want control of the system for their own benefit. These banks claim that unless they control the EFT terminals in the stores, and the telecommunication system, EFTPOS is not going to work. This is like saying banks should control the postal service because cheques are sent through the mail."

McManus argues that the choice of systems should be left to the individual retailer. "If the banks control systems, they will dictate the cards accepted in the stores. In effect this means the

stores' customers must become the banks' customers."

McManus denies his campaign is a vendetta against the banks, but rather concerns competition and establishing the best EFT network. "Australia is in the midst of an electronic banking revolution and it is important we get it right now. A free, open and flexible system in Australia offering access to all retailers and all financial institutions will mean everyone is getting the best deal and guarantees Australia's technology will keep pace with the rest of the world." □

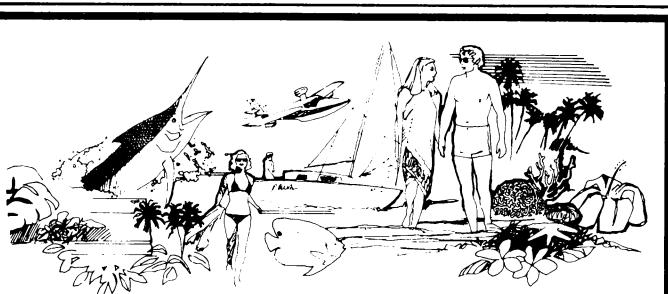
PC THEFT DATABASE

A Sydney public relations consultant, Steve Townsend, has set up a PC Theft Database after having two computers stolen from his office.

According to Townsend, organised groups are gaining access to lists of computer owners, stealing their equipment and selling it through classified advertisements. IBM PCs and compatibles are most at risk, and it was two IBM clones which were stolen from Townsend's premises on a Saturday afternoon.

"It was obvious the thieves knew what they were after," said Townsend. "They broke in, walked straight past cameras, typewriters, video and sound recording equipment; all they wanted were the two computers. It's clear to us who gave the thieves the details about our computers, but we need more statistics before the police can take action."

Townsend recommends the following action to reduce the threat of theft: ►



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■ Be cautious about giving your address when joining user groups, taking out magazine subscriptions or joining bulletin boards. Use a post office box address if possible.

■ Engrave your name and driver's licence number prominently on the machine. Put signs announcing the fact on doors and windows.

■ Record the serial numbers of your system, as well as the monitor and even circuit board.

■ Don't leave valuable data disks in drives when the premises are unattended.

If you do have a computer stolen, apart from reporting it to the police, have the details recorded on the PC Theft Database, by calling (02) 81 3070. □

RECORD CONTRACT TO MORROW

Morrow's neat little portable computer, the Pivot II, has won the huge United States Internal Revenue Service contract for portable computers, in the face of stiff competition.

The contract is for 15,000 portable computers, reputedly the largest order for portable micros to date. The order will be manufactured and delivered by Zenith, a licensee of Morrow for the Pivot design.

The contract has been looming over the United States portable

scene for some time, with rumours abounding that IBM would announce a laptop machine purely to contest the contract. Instead, the Pivot has succeeded by offering extensive IBM PC compatibility, a built-in disk drive and a back-lit LCD screen. Morrow's success is bound to influence the shape of the laptop market — one of the most competitive and unpredictable areas of the computer retail scene. □

THE WORLD OF UNIX EXPOSED

This year's Unixworld conference and exhibition is to be held at the Sydney Hilton International Hotel from May 6 to 8. Over 500 delegates are expected to attend, with over 1000 visitors anticipated at the exhibition.

The theme of Unixworld Expo '86 will be 'In Search of Solutions', with 28 international and local speakers; a further six Unix specialists will lead a series of tutorials held in parallel with the conference. Speakers will include Ron Wong, DP manager for Ford Motor Company's North American engineering division; Donald O'Shea, director of Amdahl's Unix product development team; Harry Garland, president of Cromemco; Ted Delotta, senior vice president of Interactive System Corp — the developer of PC/IX; and Rooky Hayashi, senior

deputy manager of Mitsubishi Development. Companies exhibiting at the Expo include IBM, NCR, Labtam International, Olivetti, Honeywell and Altos.

Another feature of the conference will be a 'hypothetical', with a panel formed from the keynote speakers and invited guests, to be held during the conference dinner. More information about the conference and tutorials can be obtained from Stephen Moore, (02) 439 5133, and about the exhibition from Ken Beever, (03) 690 2933. □

COMMODORE GETS CREDIT

Rumours have been rife recently that Commodore International is facing a financial crisis. Fuel for the fire has come from Commodore's inability to meet loan repayment schedules with its major creditors, and a nett loss of \$US53.2 million for the December quarter last year.

After obtaining waiver extensions on its loan agreements, Commodore has now established worldwide credit facilities of \$US135 million through to March 15, 1987. According to Tony Serra, the managing director of Commodore Australia, Commodore International has reviewed its forward plans, including its product strategies, and a comprehensive cost-reduc-

tion programme is already under way.

Serra dismissed as "ludicrous" the suggestion that Commodore was facing a financial crisis. "Pre-tax profit for the quarter ended December 31 was a healthy \$US1.05 million. Nett sales of more than one million computers in that period were the second highest in the company's history and produced some \$US339.2 million in revenue."

Serra said the nett loss for the quarter was brought about by restructuring charges of \$US22 million associated with the closure of assembly operations in England and a semiconductor plant in California, and "special adjustments" of \$US29 million against certain inventory and other assets. "The strong cash flow generated during the December quarter enabled Commodore International to repay \$US51.5 million of its bank debt. Another optimistic sign is the fact Commodore started 1986 with an order backlog for more than 100,000 computers." □

MULTIMATE SHEDS WORKERS

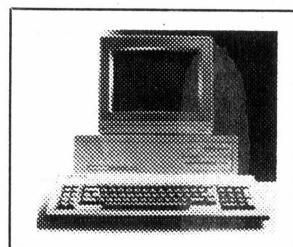
Following Ashton-Tate's purchase of Multimate International, officials have announced details of a reorganisation plan which will integrate the two companies.

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NEWS

Under the plan, the Multimate operation in East Hartford will be continued, with development, documentation, technical support and some marketing activity for the Multimate product line being sited there.

The reorganisation will result in 70 of Multimate's 196 employees being laid off over the next six months. The reductions are due to job duplication, and will affect Multimate's operations, marketing and financial departments. Thirty members of Multimate's sales force immediately joined the Ashton-Tate sales staff following completion of the acquisition in December 1985; the combined development organisations began working together on future products at an Ashton-Tate development conference this month.

As part of the reorganisation, Richard Lefebvre, Multimate's executive vice president and chief operating officer, will remain with Ashton-Tate as a consultant. Wilton Jones, president and chief executive officer, has opted to end his connection with the company.

"The assimilation of one company into a larger one is never an easy task, particularly when good employees must be told their responsibilities overlap with those of others," said Roy Folk of Ashton-Tate. "The acquisition of

Multimate remains the largest ever in the microcomputer software industry, and this reorganisation is only part of the tremendous task of combining Multimate into Ashton-Tate."

Ashton-Tate's purchase of Multimate, for approximately \$US22 million in cash, has given the company bestsellers in three software categories: database management (dBase), word processing (Multimate) and integrated software (Framework). The company is the world's second-largest microcomputer applications software company. □

COURSES IN BASIC AND UNIX

The University of New South Wales will be offering two more courses in its Continuing Education programme, starting this month.

Peter Eyland, of the University's School of Physics, will give a series of 15 lectures providing an initiation into the mysteries of programming in BASIC on a personal computer. "The course will give participants the opportunity to create something with a multitude of uses, limited only by their imagination and the development of their reasoning skills," says Eyland.

The first seven lectures apply to microcomputers generally,

starting with an introduction to programming and an explanation of terms, and followed by simple variables, programs, algorithms, flowcharts, the GOTO and INPUT commands, repetition, decision, array variables, ASCII code and subroutines.

The next eight lectures are about graphics and files, and features specific to the Apple II family of computers, reaching an advanced level of programming in BASIC.

The lectures will be broadcast over Radio University, VL2UV, at 7 pm on Mondays (starting April 21) and repeated on Wednesdays at 8 pm. Fees are \$40 for Part 1 and \$45 for part 2, which covers the broadcast programmes, a package of study materials and workshop sessions. Computing facilities are an optional extra, at \$17.50 per part. Cassettes of the series are available for \$135, including study materials.

The second course being offered will provide computer users with the opportunity to become familiar with the features and use of Unix. Dr David Carrington, lecturer in Computer Science at the university, will provide a comprehensive introduction to Unix in a 10-program series.

This series also falls into two parts: an introduction section for

the new user, covering what Unix is, getting started, creating and modifying files, commands and files; and a more advanced section on the Unix file system and shell programming, leading to a deeper appreciation of the capabilities of Unix. The course is designed for people wishing to become competent Unix users, but Dr Carrington points out that to get the most out of it some previous computing experience is desirable.

The lectures will be broadcast on Tuesdays at 8 pm (beginning April 29), and repeated on Fridays at 7 pm. The course fee of \$55 covers the radio programmes, four attended tutorial sessions, and a package of study materials. Use of the University's computing facilities with some supervision will be available as an optional extra for \$20, and a set of cassettes costs \$95.

Radio University transmits in Sydney on weekday evenings to a main reception area bounded by Hornsby, Richmond, Penrith, Campbelltown and Cronulla. Transistor radios adjusted to pick up the signal can be purchased from Continuing Education for \$12 including postage.

Full particulars are available by calling (02) 697 3175 or from Continuing Education, University of New South Wales, PO Box 1, Kensington 2033. □

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COMPUTER OF THE YEAR

Elsewhere in this issue you can read the weighty words — following weeks of weighty consideration — regarding the *Your Computer* Personal Computer of the Year. Undoubtedly where you stand on the issue depends in part, as the old political adage suggests, on where you sit.

For most computer aficionados, the 'computer of the year' is one that has a bigger colour palette and more musical voices than its predecessors, has an extensive software base, and is less expensive than anything before it — above all, less expensive.

From a manufacturer's viewpoint, it's any machine that has not driven them into bankruptcy. This has not been at all a good year for manufacturers, except for a select few — notably Compaq, whose sales recently passed the \$500 million mark after only four years in business. That's an astonishing record — probably unequalled in world business history.

For computer retailers and resellers, the Computer of the Year, by any reasonable measure, has been anything that's compatible with either the IBM or an Apple — and preferably backed up with big advertising bucks as well, to get the message to customers.

(Not all resellers or retailers have been fortunate lately. Prices are dropping, putting a squeeze on retailer margins. Corporate customers are also putting the squeeze on retailers for volume discounts and more support; and manufacturers are squeezing them by demanding greater service and support for customers. So life has not been easy for them. Here in the Boston area, for example, more than a dozen computer retailers have shut their doors in the past year.)

Many observers here believe most of the easy sales have already been made. In a sense, micros have probably been more bought than sold, which means the climate may well get increasingly uncomfortable for retailers and manufacturers.

For at least three years running, many consumers and 'industry observers' have predicted the computer of the year 'this year' would be a laptop. Unfortu-

AMERICAN GRAFFITI

BY HOWARD A KARTEN

nately, that's not yet come about. There's good reason to believe it will be a while yet before an honest-to-goodness, practical portable will appear. For now, machines which have disks and can be moved from place to place comparatively easily are generally known as 'luggables'. They're not really intended to slip into a briefcase.

From the viewpoint of the technophile, the computer of the year (in the United States) was probably the Amiga or Atari 520ST, with their advanced graphics and sound capabilities. Perhaps soon we'll see an in-

crease in the number and range of software packages available for these computers, so they'll be able to live up to their promise.

So from the United States perspective, what's the computer of the year? My hardware is four years old, seemingly indestructible, and has been dismissed by technophiles since it appeared as "not advanced technology." But by now, I'm happier with it than ever. I have to admit I'm comfortable with the computer I know so well, especially with the short, familiar escutcheon that faces me from the left side of my keyboard and machine.

As I said, sometimes where you stand depends on where you sit.

INTERNATIONAL COMPUTER USERS' GROUPS ASSOCIATION FORMING

With user groups for virtually every brand of hardware or software (or geographic locale) growing almost as fast as microcomputer makers have been dying off, it was inevitable some entrepreneur would find a reason, and a way, to make life easier for them.

Now, in Lexington, Kentucky, David Reed is trying to do just that through the nascent International Computer Users' Groups Association. Reed, director of library services for a Lexington newspaper, envisions ICUGA as "not an umbrella organisation, but a service organisation to help user groups solve common problems."

He has a list of approximately 3000 users' groups throughout the United States and Canada, and has already sent electronic letters to nearly 400 of them in other countries, including Japan, Holland, the UK, Australia, and others. If even a fraction of them spring for the \$US25 membership fee ICUGA is asking for, Reed figures he'll be able to provide a plethora of services to user groups and members. Those services would include negotiating discounts with manufacturers, exchanging technical data and possibly freeware, producing newsletters, and so on.

Some 'big names' have agreed to serve as board members, Reed reports, and the first board meeting — appropriately enough using electronic conferencing facilities — was scheduled for late February.

Reed can be reached at Suite 100, Security Trust Building, Lexington, Kentucky 40507; on the Source at BCK382; on CompuServe at 73475,1027; on BIX at DREED; and on Delphi at CRITIC.

RIPENING APPLE?

Some very interesting things appear to be afoot at Apple Computer these days.

As reported here some months



ago, Apple Computer and Steve Jobs parted company quite acrimoniously, with much talk on both sides of turning things over to the lawyers. The most recent development there is that Jobs and Apple reached an out-of-court settlement of their differences, involving no exchange of funds.

And, as we also reported, Apple and DRI had been exchanging legal threats regarding the 'look' and 'feel' of DRI's Graphics Environment Manager, or GEM. The latest move there, too, seems to be a significant lowering of legal voices.

At the same time, in a superficially unrelated development, Apple officials indicated a forthcoming version of the Macintosh would be built on the open architecture principle, unlike the original Mac.

What does it all mean? Is it possible Apple is entering a new phase of corporate life in which it

prefers to seek accommodation and harmony with others, rather than contentiousness? Holy mackerel; we can think of another very large, very well known computer company whose corporate culture has long stressed the benefits of everyone playing nicely together ...

IBM TAKING A RISC?

IBM became the first vendor to announce a so-called reduced instruction set computer (RISC), with shipments of the machine scheduled to start in March (United States prices: \$11,700 to \$19,500). The machine comes with a minimum of 1 Mbyte of memory (maximum 3 Mbytes) and a 40 Mbyte fixed disk drive.

IBM is calling the machine the RT (RISC Technology) PC. Externally, it looks identical to the AT, and includes expansion slots compatible with AT boards. By itself, the RT cannot run conven-

tional PC-DOS programs, but a \$US995 PC AT co-processor card and a \$US550 co-processing program will achieve that.

The heart of the RT is a proprietary chip, developed by IBM in America and abroad, which has a repertoire of only 118 instructions (vs the 134 of the conventional PC).

The result is a processor rated by IBM at between 1.6 and 2.1 MIPS (millions of instructions per second).

The operating system for the machine, called Advanced Interactive Executive (AIX) by IBM, is a proprietary version of Unix System V.

The top-of-the-line models 25 and A25 will be available in September, according to IBM.

ANTI-HACKING MEASURE?

In Washington DC, cash management analyst Alvin Frost, who

works for the District (that is, city) government, was embroiled in some long-running disagreements with his managers over ethics and other issues. He also suspected someone had made unauthorised alterations to his files on the District's Master Financial Accounts System, so he changed his password.

When asked to retrieve his work, he claimed he'd forgotten the new password, so the files could not be retrieved. He was then placed on leave — but that did not sufficiently jog his memory.

Frost recalls the forgotten password was in some way related to the United States Declaration of Independence, although several readings have again been insufficient to jog his memory. So the latest news, as we go to press, is that Frost has enlisted the help of hackers, via clues placed in the Washington Post. □

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EVERYONE LOVES A

It's time for a shock announcement... IBM's PC AT is the 1986 Personal Computer of the Year!

Yes, the company that is so expert at slowing the rest of the world down to its (walking) pace can also take a jump now and then, and that's how the judges saw the AT — a leap that will take the rest of the market along a new high-performance, advanced-capability path.

They faced a difficult decision, and it wasn't just the elimination of several superb new portables — it was choosing between the IBM and the rash of improved-performance AT lookalikes which have followed it.

The Texas Instruments Businesspro, for example, is a far more elegantly designed machine, with major performance and graphics improvements — it hardly seemed fair to put the IBM ahead of it.

But in the final analysis, the fact this rash of supermicros followed the AT confirms it as winner — IBM advanced the state of the art, the others built on its lead in much smaller steps. And it's much easier to improve on a given design than to design it in the first place...

The Software Product of the Year is Q & A, which most people will find less surprising than IBM's victory, because they haven't heard of it!

Released late in the year, Q & A is a database package driven by what most people see as the next wave of software engineering — artificial intelligence. While it isn't an 'expert system', it uses artificial intelligence techniques to provide what the market seems to be waiting for, usable user-friendliness.

A-Judging We Will Go . . .

As before, our judges were interested primarily in establishing what machine had made the greatest technical advance in the past year.

We should be careful to make the point that the title of 'PC Of The Year' does not imply the winning machine is the one everyone ought to buy. There is no such thing as a 'best' PC; however, there are obviously machines which are significant because of their use of new technology, their

The time has come, the Bellrus said, and so here we are again, deliberating the technical advances in the past year in the computer industry. What was the great leap forward of 1985? Our judges found the answer, in an unlikely place . . .

greatest step forward in the state of the art.

The Special Commendation for Australian Hardware: awarded for Australian achievement in hardware design, support and marketing.

The Special Commendation for Australian Software: awarded for Australian achievement in software design, support and marketing.

It is important to recognise that the Awards and the Special Commendations serve different purposes. The main PC and software awards are primarily decided on technical innovation and excellence, product support, utility and other criteria, with little attention paid to market success. This is because newly released products may only have recently appeared on the market and barely started to sell.

The Australian commendations consider not only products released in the past year, but products which have achieved notable success in the past year, either commercially or in terms of software support, upgrades, technical excellence or, in particular, export success.

Personal Computer of the Year

The short-list of finalists for the Personal Computer Of The Year Award comprised:

- Data General One
- HP Integral
- IBM PC AT
- Kaypro 2000
- Morrow Pivot
- Sharp PC 7000
- Toshiba T1100
- TI Businesspro

Once again, the list was dominated by portable computers, recognition by the panel of two factors: one, there has been considerable progress in portable technology during past year; and two, portable computers, through their availability, represent higher utility than desktops.

In this category, we see the Data General One, one of the earliest laptops to offer a measure of IBM compatibility, the Kaypro 2000 from the well-known United States portable manufacturer, and the Toshiba T1100, which also offers IBM compatibility.

WINNER?



Who Wunnit?

However, a new category of portable has appeared, somewhere between the laptops and the sewing-machine-sized transportables. These machines incorporate a vertical back-lit LCD screen and full-sized 13 cm drives, offering an even higher level of IBM compatibility. This category is

represented by the Morrow Pivot II and the Sharp PC 7000.

At the top end of this category, but distinguished by its operating system software, as well as its size, is the Integral PC from Hewlett-Packard, a portable computer with built-in printer, which runs the

Unix operating system.

Two desktop computers made it to the short-list. First the IBM PC AT, significant for its new processor, increased memory capability and the possibilities it opens for IBM in PC applications. The second desktop is the Texas Instruments Businesspro, which offers AT compatibility and some enhancements of its own.

The committee deliberated long and hard before entering the final evaluation session. The consensus reached was that the lap portables did not represent all that major an advance over last year's winner, the HP 110, except in the area of IBM compatibility, where they were, of course, following an obvious market trend.

The Morrow and Sharp machines, likewise, were innovative in providing a far better-quality display and a new style of packaging, and in incorporating 13 cm drives, but were fundamentally based on existing technology.

We were now down to three machines: the HP Integral, IBM PC AT and the TI Businesspro. Despite its excellent design, its superior performance and expansion capabilities, the judges decided that the TI machine was essentially following IBM's lead, and that the AT would have to lead it in innovation.

Deciding between the remaining two machines was not easy. The HP Integral, on the one hand, is extremely innovative, both in terms of its packaging and its use of the Unix operating system. Its graphics are superb, and the PAM operating system shell puts a friendly face on Unix, which virtually any user will find attractive.

The AT is innovative in its use of the 80286 processor; IBM was early in adopting it, and it is clear that many other manufacturers delayed their own product development to see which way IBM would jump. The AT, therefore, could be considered less innovative than the Integral, but more significant in its impact on the industry. Software vendors have released enhanced versions of their products for the machine, and it is clear it is attracting industry-wide support.

On balance then, the AT wins the day. In designing this machine, IBM clearly listened to what the market wanted, and took the opportunity to fix keyboard problems, upgrade disk capacity and provide a machine suitable for high-performance applications, which can support multiple users or perform well as a network file server. This opens up new opportunities for IBM, and for third-party suppliers.

WHY THE AWARDS?

THE *Your Computer* PCOTY was the world's first Personal Computer of the Year Award, and in its four-year history it has achieved an enviable reputation for independence and integrity. Through the appointment of an independent panel of experts, who are knowledgeable users yet exempt from commercial pressures in their work, the Awards are guaranteed to be unbiased and based purely on merit.

The Awards have two fundamental purposes, in keeping with their two major audiences.

For the magazine's readers — the public at large — the computer industry is becoming more and more visible. There is increasing marketing activity, increasing competition for the consumer's attention, and this — coupled with the increasing complexity of the computers themselves — means that it is more and more difficult for the prospective purchaser to decide what, if anything, to buy.

Therefore, the fundamental rationale of the Awards is to draw attention to worthwhile products; those products released in the last year that offer new features, improved quality or other enhancements. The independent assessment of the Award panel means that even products which have minimal promotional backing can stand out simply on the basis of their performance.

The second audience for the Awards is the industry itself, of which we are a part. It is important for the industry to recognise outstanding achievement, and it is important for achievers to feel they are encouraged and supported by their peers.

This factor is, we feel, especially vital in the case of the Special Commendations for Australian achievement. Australia has the beginnings of a successful computer industry, one that is starting to achieve success in overseas markets. It must be encouraged. □

THE JUDGING PANEL

SELECTING OUR award winners is not a trivial undertaking, and so we set out to ensure that our own personal foibles and preferences could not influence the decision. We did this by selecting a panel of judges who are both experienced and independent.

As in previous years, the panel comprised five members:

Dr Robert Graham is head of the Department of Finance at the New South Wales Institute of Technology, and is a leading expert on the use of personal computers in a corporate environment.

Phillip Grouse, formerly of the University of New South Wales and now an independent software developer, has long experience with microcomputers, including the design of a multi-user Z-80 system in 1979.

Dr John Barrett is a lecturer in the School of Education at Macquarie Uni-

versity, and has been working with micros since 1969.

Len Rust is the managing director in Australia of International Data Corporation, a major US marketing consultancy company specialising in the data processing and communications industries.

Les Bell, managing director of Les Bell and Associates and Consulting Editor to *Your Computer* magazine, has been writing about, building, programming and using microcomputers and personal computers since 1975.

The members of the panel have between them something over forty years' experience with personal or microcomputers, and should have at least some idea of what makes a good personal computer! They also have almost one hundred years' experience with computers generally. □

Software Product of the Year

The selection of the Software Product Of The Year proved to be every bit as difficult. The finalists were:

■ **Clipper:** a popular compiler which speeds the execution of dBase III code. Clipper does not support some dBase features — basically those which are not required in programmed applications anyway — and enhances some dBase capabilities.

THE PANEL'S CRITERIA

THE PRINCIPAL aim of the awards is to find the computer products which have made the greatest step forward in technology during the past year. Machines and software must have been released on the Australian market during the past year, and in order to distinguish between 'announced' and 'released' (the computer industry is full of vapourware) the panel requires that at least 50 units have been sold, although that requirement may be waived at the panel's discretion.

Companies may not nominate their products for the award; this provision eliminates commercial pressure on the panelists and helps keep the 'short-list' down to manageable proportions. In any case, the panelists are all active either in the computer industry or as consumers of hardware and software, and are aware of the major products released during the year.

Products which make the short-list are evaluated against the following criteria:

- Technical excellence in design and engineering, particularly provision of advanced or new features.
- Ergonomic design, in terms of both hardware and software.
- User support, documentation and training.
- Value for money.
- Performance.

However, the award panel is not constrained to consider only those criteria, since a new machine could be released which, while obviously significant, would not score well against the pre-ordained criteria. Some subjective judgement must obviously be applied.

■ **Concurrent PC-DOS 4.1:** The multi-tasking windowing operating system from Digital Research, which has the capability of running four programs at one time, and can support two extra users.

■ **Execuvision:** Prentice-Hall's presentation graphics package, which allows users to generate graphics slide shows by creating their own images and blending them with pre-created graphics libraries.

■ **GEM:** Digital Research's Graphics Environment Manager, which provides Macintosh-like mouse-driven software on the IBM PC. GEM applications include a word processor with graphics capability (GEM Write), a painting program (GEM Paint) and an object-oriented charting/line graphics program (GEM Draw).

■ **Grafix Partner:** A co-resident program which can be invoked at any time to capture a graphics screen from another program and edit it, adding enhancements, changing colours and perhaps adding text.

■ **Newsroom:** A program which allows the preparation of small publications such as school newspapers or trade catalogues. Facilities provided include copy editing, graphics editing, page composition, printing and data communications.

■ **Q & A:** A database management system with integrated word processor and natural-language query processor. While the database does not compare with, say, dBase III Plus, the natural-language query facility is very impressive and the word processor is more than adequate.

■ **The Spreadsheet Auditor:** A program which allows users to document and maintain large spreadsheet models in Lotus 1-2-3, Symphony and Supercalc 3. This elegant toolkit corrects some major deficiencies in these spreadsheet products.

■ **Timeline:** A powerful yet simple-to-use project management package with impressive design, documentation and training materials. A variety of project management packages has been available for years, but none has combined power with flexibility and ease of use to the same extent as Timeline.

Comparing such widely disparate products is difficult, but the judges sat down in front of their PCs and tackled the task with relish. It soon emerged that the judges were mostly investigating three packages, and the short-list naturally narrowed down to suit: Q & A, The Spreadsheet Auditor and Timeline.

Q & A is an extremely innovative product, making use of recent developments in

natural-language parsing and artificial intelligence research. While its database appears at first sight to be simplistic, it is actually quite powerful, and its word processor is adequate. This package naturally complements a spreadsheet such as Lotus 1-2-3.

The Spreadsheet Auditor also complements spreadsheets, but in a different way. Heavy spreadsheet users have found that large models can be difficult to document and debug (rather like large BASIC programs), and this program provides four modules for displaying spreadsheet contents as formulae, not values, displaying macros, generating cross-reference listings and keeping track of named ranges. Its innovation is primarily in the way it intimately picks up information from another product and complements that product.

Timeline is interesting because it combines power with ease of use. Its design features a highly consistent user interface, coupled with a well-organised yet quite readable user's manual. A tutorial course, provided in both audio cassette and 'novellette' form, offers a well-paced introduction to the package. Timeline's major strengths are its presentation and support.

In the end, however, the judges wound up clustered around the PC running Q & A, trying to faze its natural language query system. It was obvious this was the most innovative product they had seen in a long time. Problem solved! □

A FUNNY THING ...

YES, WE know we told you about the seven Software Product of the Year finalists last month, and that this month we have nine of them.

No, we didn't throw a few extras in at the last minute. We just suffered one of those inevitable communications breakdowns (which we'll follow-up after the awards with a nervous breakdown). The person who wrote the story in the March issue wasn't one of the judges and, because it was done so late, they didn't get to see the finished article.

Of course, it was entirely accurate — except for the fact our intrepid reporter didn't receive page two of the short lists! Our apologies to Timeline and Grafix Partner, the deserving finalists who missed out on our March story. □

A new transp for corporat

Sharp PC-7000

Real power - 384K RAM

The standard Sharp PC-7000 system comes with 384K memory (expandable to 768K in 128K modules) which provides plenty of memory capacity to handle large spreadsheet or database applications as well as ensuring your system is capable of keeping pace with your business growth.

The CPU operates at 7.37 MHz: it's so fast that there is an optional mode available to reduce the speed of the Sharp PC-7000 to match the speed of the IBM PC™ for run-time dependent applications.

In addition to the high-speed, 8086 16 bit microprocessor and the large memory capacity it also has a battery supported real time clock.

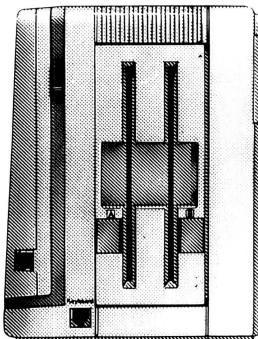
Fully compatible

A high level of IBM PC™ software compatibility ensures a large, established software library making the PC-7000 ideal for the office environment. The PC-7000 runs Lotus 1-2-3™, Open Access™, Flight Simulator™, Symphony™ and most popular IBM compatible software.

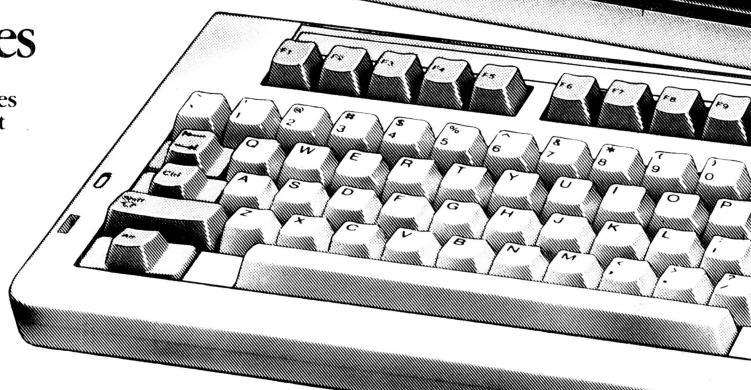
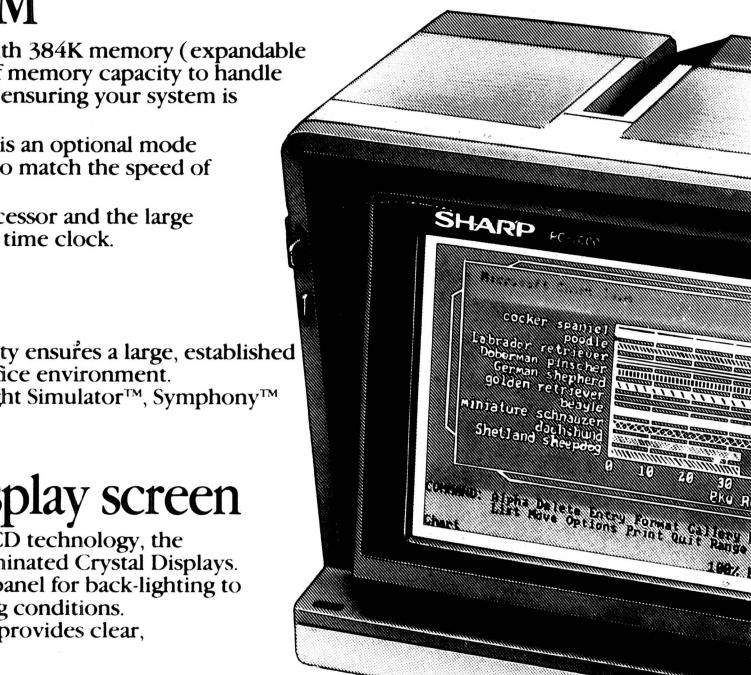
Illuminated crystal display screen

Taking advantage of the very latest in Sharp LCD technology, the PC-7000 features the first generation of back-lit illuminated Crystal Displays. The bit-mapped screen uses an electroluminescent panel for back-lighting to provide enhanced screen visibility under any lighting conditions. A 25 line by 80 characters, 640 x 200 pixels display provides clear, detailed graphic images and text display.

Built-in twin disk drives

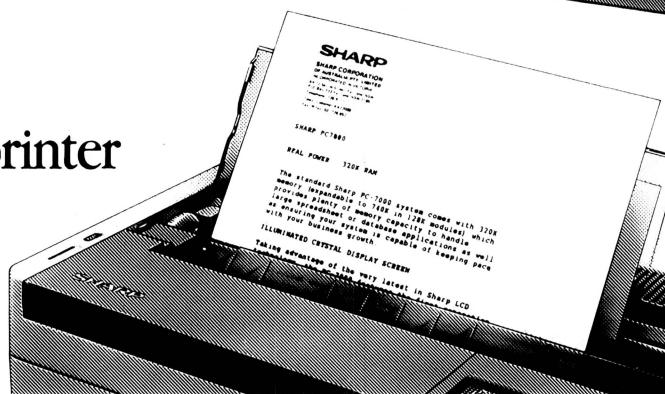


The twin 5 1/4 in. disk drives are built into the main unit providing full computing power in the standard system and making it easy to obtain application programs from a huge range of off-the-shelf software.



Quality printer available

Completing the system is an optional near letter quality, silent, non-impact printer operating at speeds between 20 and 84 characters per second.

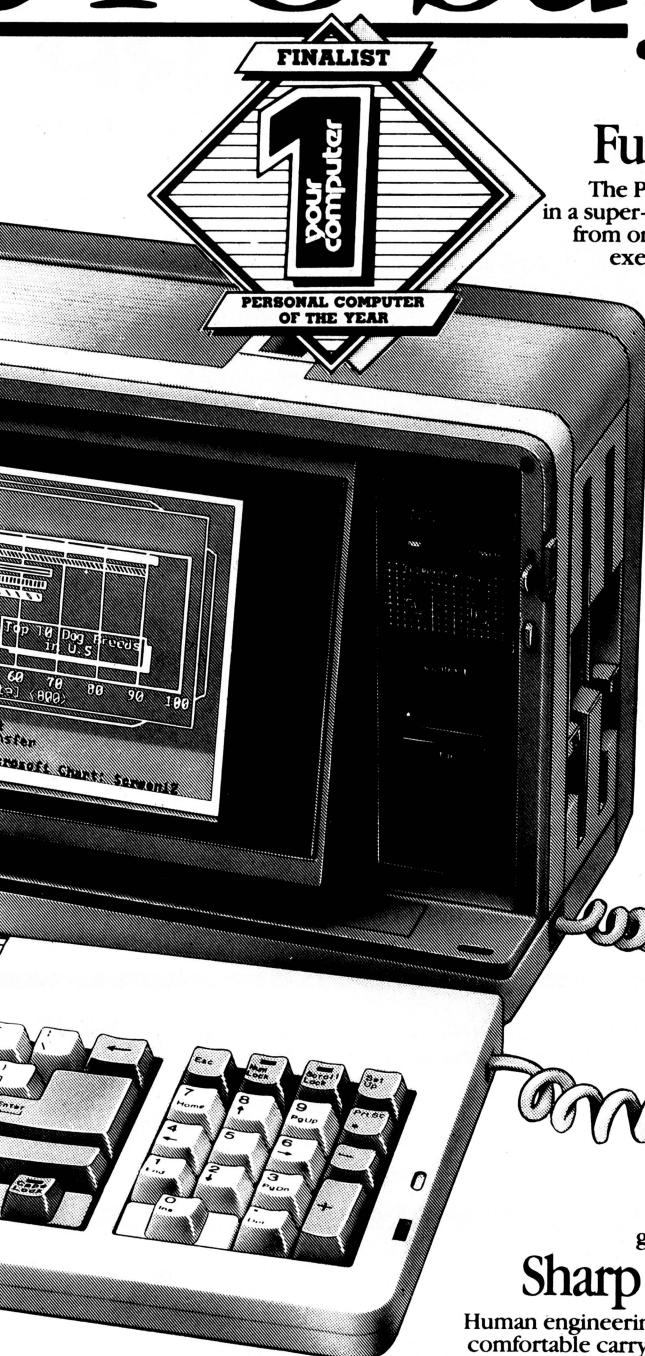


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Design, specifications and price of the Sharp PC-7000 and options subject to change without notice.

portable choice

for PC buyers.

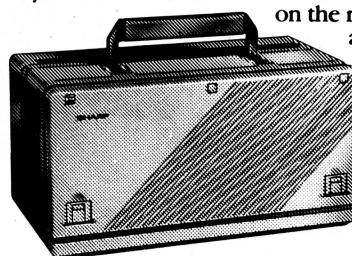


Fully transportable

The PC-7000 is designed with a minimum number of chips resulting in a super-compact, lightweight personal unit which can easily be moved from one place to another. It offers new flexibility and power for busy executives, project managers, financial analysts and other business professionals on the move.

With its built-in disk drives and keyboard which folds up over the screen, the PC-7000 takes up only a small space on your desk. For those times when it is to be taken out

on the road a padded case is available to carry the complete unit – CPU, disk drives, keyboard, screen and printer.



Priced to go, too

The Sharp PC-7000 is available now at the recommended retail price of \$3,210, plus sales tax if applicable, with no additional costs.



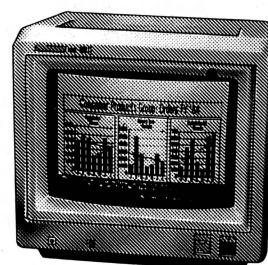
Included as standard are RS232C and Centronics interfaces, real time clock, twin disk drives and 384K RAM.

Optional extras soon to be available include an expansion unit giving 3 full height card slots and cableless 3½ in. 10 Mb hard disk option.

The addition of the optional colour monitor adaptor to the main unit allows connection of a range of colour monitors. This is particularly useful for spreadsheets and graphics which make use of colour.

Sharp quality

Human engineering is emphasised throughout the system in features such as the comfortable carrying handle and adjustable display angle of the full-size, tiltable, AT-compatible keyboard which has been ergonomically designed.



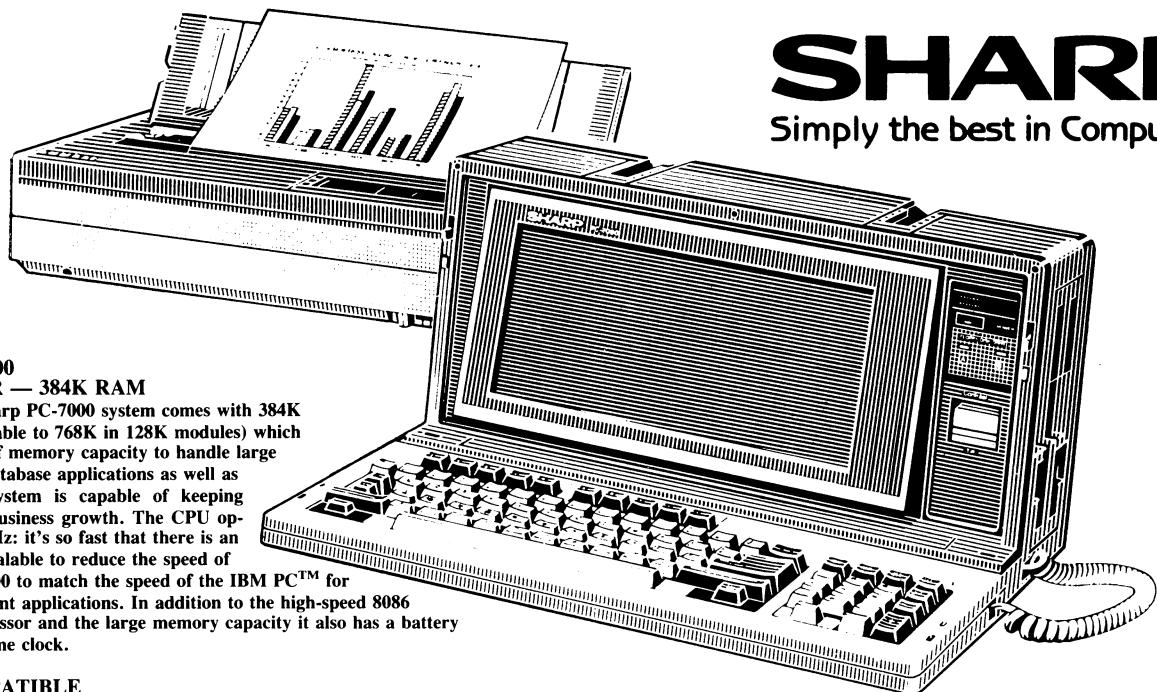
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SHARP PC-7000

REAL POWER — 384K RAM

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BUILT-IN TWIN DISK DRIVES

The twin 5½ inch disk drives are built into the main unit providing full computing power in the standard system and making it easy to obtain application programs from a huge range of off-the-shelf software.

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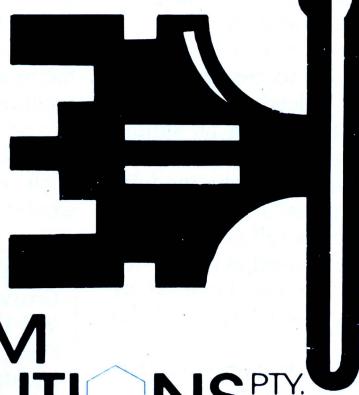
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Software Finalists

VCN EXECUVISION

Execuvision can, with a little patience, be used to create very sophisticated graphics indeed. These can include advanced features such as simple animation, variations in text size and colour.

VCN EXECUVISION, from Prentice-Hall, is a graphics program with a difference: while the bulk of graphics programs are designed to graph the data put into them and produce bar graphs, line charts and pie charts, Execuvision is designed for presentation graphics and can do a whole lot more.

By presentation graphics I mean not just barely enhanced charts which serve to get a point across — "Look at this pie chart, boss, it clearly shows how Acme Widgets dominates the market" — but graphics which are designed to impress. To this end it supports not only graphing functions, but also text generation for making slides, and freehand graphics for illustrative points.

Execuvision is a fairly large program, which is partly due to its being written in compiled BASIC. Once loaded, it presents the user with a menu at the bottom of the screen, offering the options: CREATE, PREPARE, PRINT, RUN and QUIT.

The CREATE option is used to make drawings by 'painting' on the screen. A two-line menu at the bottom of the screen offers the user the ability to work with objects (arrows, circles, diamonds, that sort of thing) or text; cut part of a slide out; save a slide; sketch a picture; load a slide or pix (part of a slide which can be overlaid onto a background); and perform other tasks.

Text can be inserted in any of a number of fonts: Futura, Sngdot, Italic, Data, System, Block1, Eurostyle1, Block2, Euro-

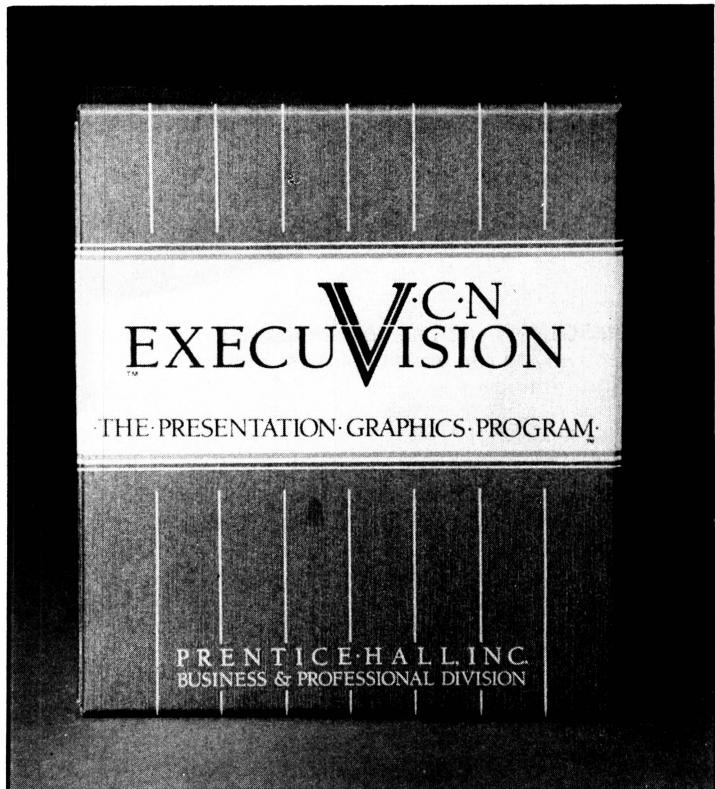
style2 and Bold. In addition, text can be altered in size and in aspect ratio, to produce condensed or expanded typefaces.

The menu selection process is slightly tedious; there is no shorthand for selection other than moving the cursor to the choice and pressing return. Some of the menus can take some time to get through, and because of its size Execuvision sometimes has to waste time loading overlays from disk. This is compounded by the product's copy protection scheme and its clumsy installation on hard disk, which means it still refers to drive A: from time to time.

In addition, Execuvision maintains its own directory structures for slides, so the DOS COPY command cannot simply be used to copy files around — making hard disk usage somewhat awkward.

Nonetheless, Execuvision can, with a little patience, be used to create very sophisticated graphics indeed. These can include advanced features such as simple animation, variations in text size and colour. The best results are obtained by using the VCN Execuvision Graphics Libraries, sets of diskettes full of slides and pix which can either be used as a basis for further modification or can be used as they are, as outlines or as backgrounds for text or graphs.

Several graphics libraries are available, covering topics such as industry and busi-



ness, faces and figures, famous landmarks, maps of the world, decorative initials, ornate borders, symbols for time and, of course, a section devoted to computers, with PC screens, keyboards, mainframes, sheets of printout and other images.

Once the slides have been created, they can either be printed out or saved in a slide sequence, which can then be presented using the program. I have used this program on a couple of occasions, with a Barco projection television and a large (3.5 m) screen, with quite spectacular results. Better results are possible with specialised equipment, but not at this price.

Execuvision is a very interesting program. Its capabilities are impressive and the support, in the form of graphics libraries on disk, is extremely useful. However, because of its tedious, BASIC-imposed menu selection and the clumsy copy-protection method, it can be very frustrating to use. Taking all things into consideration, however, one can forgive it for being such a clunker to use, because it does what it does so well. □

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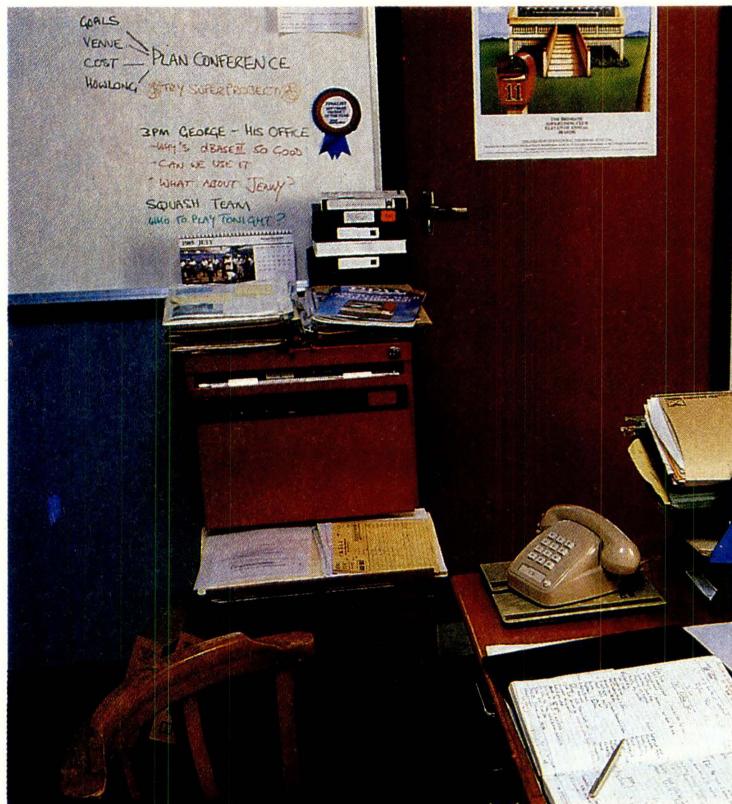
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Software Finalists

GRAPHICS ENVIRONMENT MANAGER

DEAR OLD Digital Research hasn't weathered the storms of the marketplace too well. In recent years it has suffered from brilliant products mismarketed, and other none-too-brilliant products. The company has now decided to base its future on two products: Concurrent PC-DOS (also in the SPOTY short list) and GEM.

GEM (short for Graphics Environment Manager) grew out of work DRI had done earlier on the GSX (Graphics System Extension) system for device-independent graphics drivers, combined with attempts to design a visual shell for Commodore (now seen as the File Manager in Concurrent DOS). After seeing the Macintosh, the people at DRI said to themselves, "You know, we have most of that already; all we'd have to do is put it all together." So they did, and the result was GEM.

GEM is really a Virtual Device Interface, which can be customised to drive a variety of displays (IBM Colour Graphics Adaptor, Enhanced Graphics Adaptor and the Hercules Card, among others) with prodigious speed, together with an operating system shell called the GEM Desktop. This latter program displays directories as windows and files within them as small boxes, called icons, which represent either documents or programs.

A program can be run simply by moving the cursor over it and clicking the mouse twice. Alternatively, if GEM knows (from the filetype) what kind of application is required to edit a document, that application can automatically be invoked by double-clicking on the document.

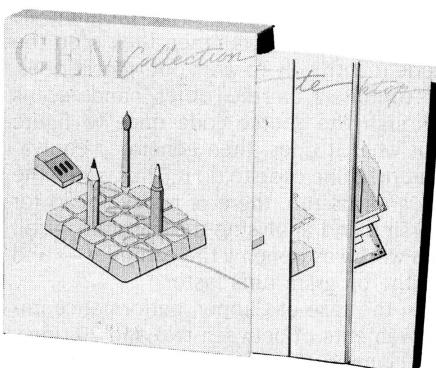
Just like on the Macintosh, files can be copied by picking them up with the mouse, and deleted by placing them in the trash can. It was too much like the Macintosh, in fact, for Apple's comfort. The big fruit threatened to sue DRI over the design of GEM, even though most (if not all) of the concepts involved were developed by Xerox and only subsequently appropriated by Apple. For some unaccountable reason, DRI rolled over and played dead, settling out of court and agreeing to change the design of GEM. (One might wonder why DRI never sued Microsoft over the design of MS-DOS.) A

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new version of GEM is therefore expected momentarily.

The GEM Collection, a set of programs which works with GEM through its VDI and mouse-handling routines, provides a good display of what GEM is capable of. GEM Draw is a graphics program which manipulates a library of pre-defined shapes to create organisation charts, diagrams and the like. The program supports a selection of type styles in sizes from 10 point to 72 point.

GEM Paint, on the other hand, is a mouse-driven freehand graphics program like Macpaint, which allows brush drawing, spray painting and other graphics



techniques to create an image on a bit plane.

For word processing, DRI has taken the popular Volkswriter (the people's word processor ...) Deluxe and extended it by providing a mouse-driven interface with pull-down menu blinds, scroll bars and all the other paraphernalia of the WIMPS (Windows, Icons, Mouse-Pointing Software) interface. Text is displayed on the screen exactly as it will print, and the word processor (like GEM Paint) also supports the latest laser printers.

GEM installs itself in a series of subdirectories on the hard disk of an XT or AT (or clone). It could, I suppose, be run on floppies, but I wouldn't recommend it. With the standard Colour Graphics Adaptor, however, the display is restricted to monochrome; colour is only available with the Enhanced Graphics Adaptor board (and if you have to ask, Mr. Rockefeller ...).

GEM does what it does with remarkable speed and consistency, particularly on an IBM AT with an EGA board, which is how we tested it. Apple has always said it couldn't be done, but GEM does it. With PC-DOS, it provides the Macintosh-like interface some users are seeking.

However, GEM has its drawbacks. First, unless specially written for GEM, applications software continues to run in its own way, possibly requiring the user to master the same skills that would make bare DOS quite acceptable. Most applications (GEM included) still direct the user to install them by giving a series of DOS commands — so GEM can't be used all the time. And second, it eats up memory, thus cutting down on spreadsheet space and effectively making the product unusable with Concurrent DOS, DRI's own operating system. Future enhancements to Concurrent may rectify this, providing a multi-tasking, windowing, mouse-driven interface. Till then, GEM may be a solution looking for a problem. □

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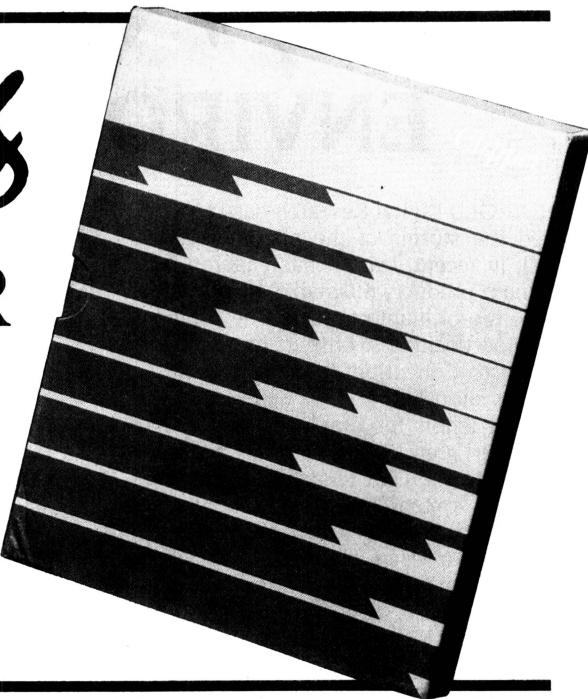
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and manuals are available for PAY-PACK (\$50.00) and CROSS-CHEQUE (\$30.00). This cost can be credited to purchase price. Both programs are available for MS/DOS and CP/M80.

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Software Finalists

Taking **THE CLIPPER TO dBASE III**



ASHTON-TATE'S family of dBase products has achieved massive popularity over the last couple of years with small software developers such as DP departments putting together applications for end users and small systems houses, as well as with small businesses wishing to create their own applications programs.

However, dBase III is less than ideal, for systems houses in particular, since it provides no security for their source code, performs poorly and is portable only to IBM hardware.

Nantucket Inc's Clipper compiler now offers a solution, accepting valid dBase III source code and producing an executable EXE file, which will run faster, without the need for source code, on any MS-DOS machine.

Interpreters such as dBase III load the original source code of a program as edited by the programmer, then scan the code repetitively to work out what it does. A compiler, on the other hand, scans through the source code once to figure out what it does, then generates equivalent machine code to do it. Thus, when the program is run, there is no overhead for parsing and analysing the program — all the work was done by the compiler — and so the program runs faster.

In the case of Clipper, performance improvements of between two and 20 times are claimed, though discussion with users

suggests improvements between three and five times are more typical. This benefit alone is worth the price of admission to most systems houses.

While Clipper is intended to compile dBase III code, it does not compile every valid dBase III statement. For a start, dBase III contains a whole slew of statements which obviously only make sense in an interactive, interpretive mode. For example, BROWSE is a command most dBase III programmers wish they could remove from the system, since it gives auditors the shudders due to its ability to allow anyone to adjust any data anywhere in the database without leaving any traces. Lack of support for some dBase commands, then, is not necessarily a problem — it can even be an advantage.

Other dBase commands not supported include ASSIST (no point), HELP (although provision is made for application-related HELP screens), CHANGE (primarily an interactive command), EDIT, INSERT (rarely used anyway) and MODIFY COMMAND (there are no command files to modify). In addition, many dBase III commands which are primarily to do with debugging are not supported, since the application should be fully debugged before being compiled and shipped to the user; these include DISPLAY MEMORY, DISPLAY STATUS and DISPLAY STRUCTURE. However, Clipper provides its own

Software Finalists

Interpreters such as dBase III load the original source code of a program as edited by the programmer, then scan the code repetitively to work out what it does. A compiler, on the other hand, scans through the source code once to figure out what it does, then generates equivalent machine code to do it.

debugging support.

There are also some differences in syntax between the two products; for example, the LIST command in Clipper requires an explicit field list, and does not default to listing all fields.

As one might expect, there are some limitations on the use of macros. Obviously, commands like USE &filename are quite acceptable, as you couldn't get far without them. However, the trick of storing an entire command into a variable and then executing it through a macro — &command — is not possible. Interestingly, Clipper is not as fussy as dBase III about macros inside DO-WHILEs.

These syntactical differences do not affect the 'runability' of code under dBase III. However, Clipper relaxes a number of constraints which exist under dBase III, and if you take advantage of these there's no going back to dBase; you now have a set of Clipper programs instead of dBase programs.

These enhancements include up to 1024 fields per record; up to 64,000 memory variables; an expanded SET RELATION TO statement which allows up to eight child relations per parent; use of user-definable functions (not the same as procedures); the ability to call user-defined functions written in C; and special support for screen saving and the display of context-sensitive help screens in applications. The manual also refers to the ability to have up to 250 files open at

once, but the current version is still restricted to 20 (still better than dBase, and remember there are no more .PRG files).

Compilation with Clipper can either be automatic — the compiler senses any .PRG files which are DOne from the main-line program and also compiles them — or done on a file-by-file basis, which encourages the construction of libraries of compiled modules (always a good idea on large software projects).

The Clipper compiler is supplied with a special version of the PLINK86 linker from Phoenix Associates. This linker is considerably more powerful than the standard MS-DOS linker and is a favourite tool of professional software developers. One of its capabilities, which is particularly important to developers of large commercial programs like accounting systems, is the ability to create overlay files, considerably extending the size of programs which can fit into a given memory size.

The current version of Clipper also supports a special screen driver for use with ANSI.SYS, allowing generated code to work with generic MS-DOS machines which are not IBM compatible. This could breathe new life into some old machines in use in many organisations.

Also supplied is a debugger, which can be linked in with an application to allow tracing of subroutine calls, dumping of memory variable values and other debugging tasks.

The Clipper documentation is sparse, but programmers with any experience at all should have little difficulty using it. Naturally, it assumes a reasonable level of knowledge of the dBase III language. However, the compiler has a rather large section of amendments at the beginning, plus a large READ-ME.IST file on the disk. This is not entirely Nantucket's fault — the pressure to get this product out must have been incredible, and virtually entirely generated by impatient users.

Clipper gives those programmers who were straining at the limits of dBase — "pushing the outside of the envelope", as it's put in *The Right Stuff* — a way to coexist with dBase III for a while longer and not have to abandon all their work. The combination of dBase III for prototyping and Clipper for production code is a particularly potent one. □

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Software Finalists

Spreadsheet

THE ENORMOUS popularity of spreadsheet programs such as Lotus 1-2-3, Multiplan and Supercalc among the accounting and financial professions has led to the existence of users whose sole PC expertise is with spreadsheet techniques. Such users run into difficulty in two directions: they try to use spreadsheets to implement large applications when they're not the most appropriate tool for the job, and they build large spreadsheets which tend to 'grow' like Topsy. If the original spreadsheet builder leaves his or her job, others are left to take over an undocumented morass of calculations, with unknown assumptions and perhaps even bugs built into them.

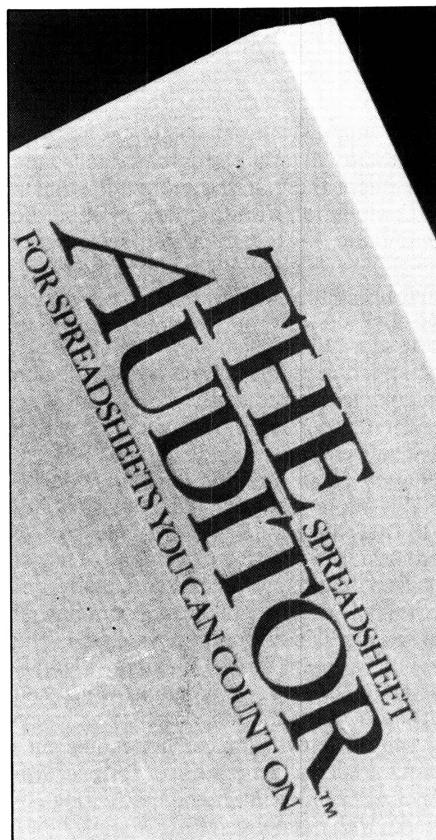
There are several ways to get around this problem. The first is to provide plenty of training for spreadsheet users so they realise the importance of using appropriate techniques when building spreadsheets. Existing spreadsheet programs seem designed to encourage the user to build larger and larger spreadsheets, with no consideration for validation and documentation of spreadsheet designs.

Consumers Software recently released a useful new tool in spreadsheet design and maintenance: the Spreadsheet Auditor provides four utilities for documenting and manipulating Lotus 1-2-3, Symphony and Supercalc spreadsheets.

The Auditor utility displays each cell's contents in formula form, neatly formatted with row numbers and column letters. Each page is stamped with the current date and time, and has a reference grid of row and column numbers for the identification of individual cells. Using printer set-up strings, this can be printed in various sizes, and even underlined to provide a grid on the main spreadsheet area to assist in locating cells. If formulae are too big to fit in the allocated space, they're wrapped around to enhance legibility.

Options allow the display of values of cells, as well as the protection and format of each cell.

An alternative view of the spreadsheet is the Worksheet Map, which displays one character for each cell, indicating whether it contains an integer, a real number,



Auditor

it refers, providing a trace or flowchart of the spreadsheet logic. Reports can be produced by function, range or individual cell. Any circular references are also reported, and the cells involved are listed. Cross-reference reports for an entire spreadsheet can grow to be very large indeed.

The Macro Analysis program extracts macros from the worksheet and prints them without unrelated detail. If one macro calls another (and they frequently do), called macros are included as well. This report is particularly useful, since some users now have macros which are more complex than many BASIC programs, and therefore pose similar problems for debugging and maintenance.

The final utility is a sideways printer program, which can dump spreadsheets to the printer in a particularly convenient orientation. Of course, the Spreadsheet Auditor's own reports can also be printed sideways.

The Spreadsheet Auditor allows its reports to be directed to the screen, a printer or a disk file. Its command structure is particularly elegant, and very similar to that used in Lotus 1-2-3; experienced users can bypass all the menus and invoke the program with a series of options on the command line, for high-speed operation. The program also copes well with the use of subdirectories on hard disks.

What the program does is not all that difficult; similar programs for analysing program source code have been around for years. This program is unusual because someone thought to do it, and gathering the necessary information about the internal structure of the spreadsheets must have been extremely time consuming.

For these reasons, plus its exceptionally clean implementation and excellent documentation, the Spreadsheet Auditor is a remarkable little program, and highly recommended to all heavy users of spreadsheets. □

The Auditor utility displays each cell's contents in formula form, neatly formatted with row numbers and column letters. Each page is stamped with the current date and time, and has a reference grid of row and column numbers for the identification of individual cells.

blank, text, formula, macro or repeating label. Lotus and Symphony users can also obtain a range report which lists all named ranges. The Symphony report also shows window locations and restricted ranges.

The Cross-reference Generator provides an index to the spreadsheet. Each cell in the output shows a list of the cells to which

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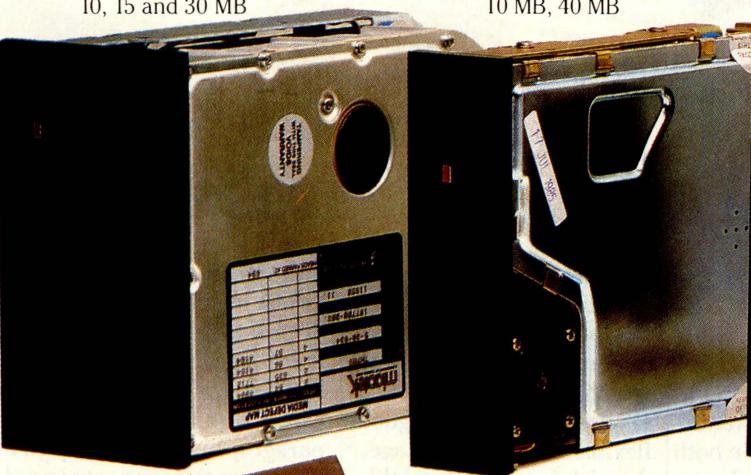
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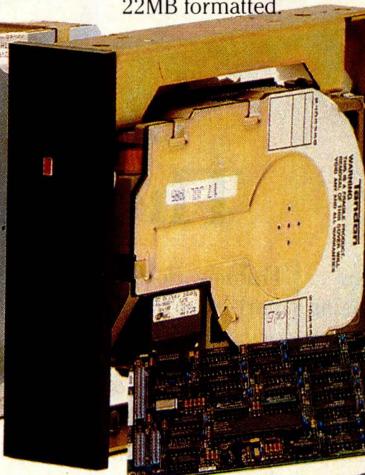
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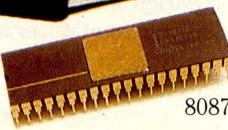
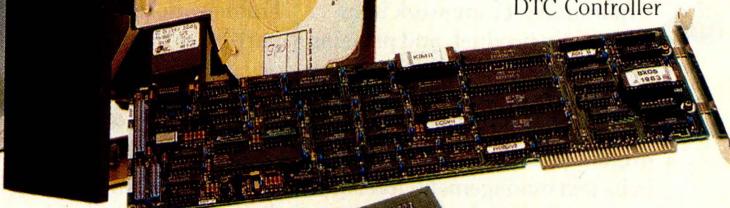


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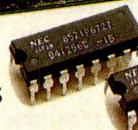
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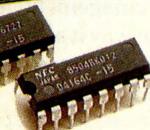
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Software Finalists

the GRAFIX PARTNER



THE GRAFIX PARTNER is an example of the new breed of co-resident software, which stays permanently in memory as you run other programs, in order to provide additional functions and enhancements to them. In the case of this program, its task is to 'acquire' the graphics images produced by other programs and enhance them in various ways.

When invoked with the command line GFX/B, Grafix Partner loads into memory and remains there in the background until reactivated by the Ctrl-Alt-Plus keystroke. This displays the Grafix Partner's help screen, which lists the various commands available. With a little practice, the commands become second nature, but at first frequent flipping back and forth between the screen being edited and the help screen will be necessary.

The drawing commands are all single keystrokes and can be given while editing the graphics screen. They include options for drawing dots, lines, boxes, circles and text, and for painting in areas and repaint-

What do all these magazines have in



They all applaud Framework.

In summary, Framework is an impressive product, and pleasing to use. It allows you to create, modify, organise and analyse information and to present it in a professional way. Its strengths lie in its text management, its ease of use, and the way it allows you to organise inter-related information.

AUSTRALIAN SOFTWARE GUIDE OCT 84.

Framework seems to have no particular bias to one work orientation or another; that is, it's not a spreadsheet with added-on features, nor is it a database with a spreadsheet tacked on. Overall, it seems to be fairly strong in both data management and word processing, and is a strong all-round performer.

YOUR COMPUTER DEC 84.

Framework is an excellent all-round product with few weaknesses. It offers true integration and tremendous versatility. If you are looking for a good, flexible, all-round package, then it is hard to go past this one.

TODAY'S COMPUTERS MAY 85.

Framework enables users to "think on the run," to formulate disparate ideas and then arrange them logically. The program uses logical steps or "frames." A frame can be a single word or number, a paragraph of text, a complex user of information, or a completed spreadsheet. Framework is an excellent program.

AUSTRALIAN BUSINESS APRIL 3, 1985

Software Finalists

ing (that is, changing colour). The block commands allow an image to be manipulated in various ways: copying, moving, turning part of an image upside down or left to right, erasing an area of the screen and so on.

The zoom function is the equivalent of the Macintosh Macpaint 'Fatbits' option — it allows the user to enlarge an area of the screen so individual pixels are quite large, then edit at that detailed level.

A scheme of colour priorities allows image mixing, although some experience is necessary to take full advantage of this facility.

An input/output submenu allows the loading and saving of graphics images, fonts and patterns. Some 20 fonts are supplied, together with a font editor program which allows the creation of new ones. Another program, CYCLE.EXE, allows the creation of slide shows.

A number of pre-created pictures is supplied on the disk, which can be used to enhance various images. For example, the

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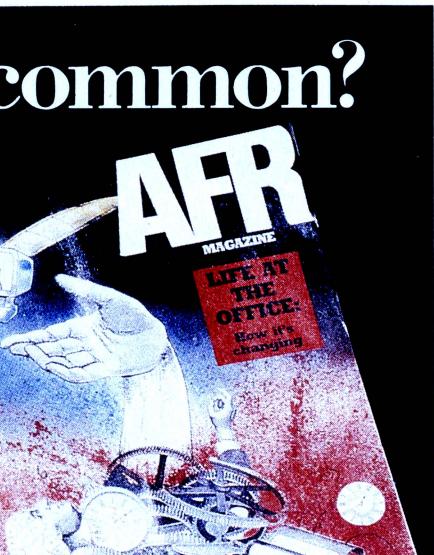
file 3D123PIE is exactly right for adding a three-dimensional effect to a Lotus pie chart. Complete directions for use of these images are given in the manual.

Having been captured and edited, an image can be saved to disk, printed on the IBM PC Graphics Printer, or dumped to the Polaroid Palette.

Broadly speaking, the capabilities of Grafix Partner are very similar to those of Execuvision. It is, however, very much more interactive in operation, but isn't supported with libraries of graphics images, which saves so much time with Execuvision and provides a much more professional image.

Grafix Partner is full of pleasant surprises; a little practice with the program will soon have you creating quite complex effects. Particularly potent is the ability to capture images directly off the screen and edit them immediately, change colours and dump to a graphics device. □

Supplier: Computers Galore, 99 Military Road, Neutral Bay 2089; (02) 908-2355.
Price: \$295



Framework offers windowing so that the integrated word processing, spreadsheet, graphics, database management and communications can be displayed on the screen simultaneously. There is a common command set for all applications and a frames editor for applications development.

99

AFR MAGAZINE SEPT 4, 1985.

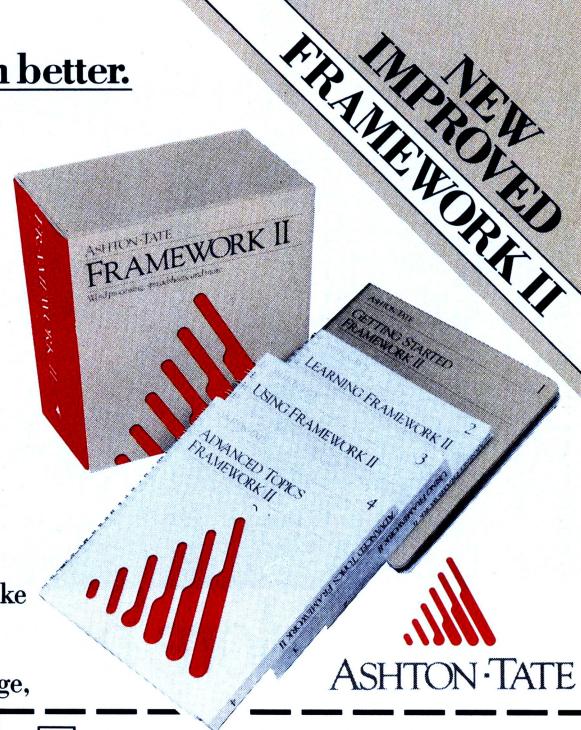
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Software Finalist

UP & CONCURRENTLY RUNNING

CP/M is dead! Long live CP/M! That's about the best way to summarise Concurrent PC-DOS 4.1 from Digital Research. Recognising that the most popular software products run under PC-DOS rather than CP/M-86, DRI set about making a version of its Concurrent CP/M operating system which would run DOS software yet provide the advantages of the Concurrent operating system, such as the ability to run multiple programs at one time.

The result is Concurrent DOS 4.1, the latest in a long line of operating systems. Concurrent CP/M is extendable through the incorporation of routines called Resident System Processes, and DRI has simply written an RSP which translates PC-DOS system calls into the corresponding Concurrent CP/M functions. The earliest version of Concurrent DOS, 3.1, provided emulation of the DOS 1.1 level function calls; while 4.1 emulates up to the DOS 2.11 level — albeit not fully.

Internally, Concurrent 4.1 bears little resemblance to its ancestor, CP/M. It supports standard CP/M function calls and will run CP/M-86 .CMD files, and reads and writes IBM PC CP/M format disks. In addition, a series of new functions has been added for file sharing, file access, process creation and management (a process is a running program — sort of), and resource sharing and management (like detaching the console so some other program can run on it).

When an IBM PC format disk is inserted into a PC under Concurrent, the operating system detects the changed disk format and handles the DOS directory structure automatically. If the name of a .COM or .EXE file is typed as a command, the DOS emulation RSP automatically translates function calls to enable the program to run.

Concurrent supports four 'virtual consoles' on the screen of the PC, which are accessible by pressing the Ctrl key and one of the digits from one to four on the numeric keypad. This process is very like switching channels on a television set: it changes the screen contents to the new program, where operation continues. The other programs, which can't be seen on the screen, continue to run unless they require input, in which case they will stop at that

Concurrent supports four 'virtual consoles' on the screen of the PC, which are accessible by pressing the Ctrl key and one of the digits from one to four on the numeric keypad. This process is very like switching channels on a television set: it changes the screen contents to the new program, where operation continues.

point. This is an important feature: some other systems allow program switching, but programs don't continue running while not on the screen.

Through the use of either batch WINDOW commands or the interactive WMENU window manager, the PC screen can be split into four (possibly overlapping) windows of different sizes and colours. This allows the simultaneous display of four concurrently executing programs, although in practice most programs require a full 80 by 24 display, and are less useful when run in windows.

Concurrent PC-DOS is supplied with a number of useful utilities. First of all, dear old ED, the line editor, has gone, to be replaced by DREDIX, a full-screen editor capable of editing two files at once, with reasonably sophisticated capabilities. Communications capability is provided by the DRTALK program, a thinly disguised version of PC-Talk III, the popular communications program.

A small name and address file program called Personal Cardfile, which is loosely modelled on a Rolodex, is also supplied. This provides simple searching on names, addresses and keywords, and can be used in its own window in a fashion similar to utilities like Sidekick.

For those who find the command line

approach to driving an operating system too complex, a menu front end is integrated into the system, and this can be used by applications programmers to generate complete turnkey systems. Also included are a sophisticated print spooler and, of course, utilities for changing file permissions, passwords and other configuration details.

Concurrent DOS can also be used in a multi-user mode; the SETUP program allows the user to set the PC's serial ports to be either printers or serial terminal ports. In theory, therefore, a PC can support three users: one on the PC's inbuilt screen (possibly running four programs), and two on external terminals. However, the external terminals can't run a lot of software which addresses the PC screen directly, and so in many cases are of limited use. Even when running appropriate software, the pea-powered processor in the PC means the terminals are best suited to light enquiry applications.

Concurrent is able to run a lot of PC-DOS software with no difficulties, although some programs, particularly those with copy protection, run into problems. But favourites such as Lotus 1-2-3 work fine. However, since Concurrent itself occupies almost 150 Kbytes of memory, large spreadsheet builders will run out of space quickly, particularly if they are running other programs at the same time — which is, after all, the *raison d'être* of the system.

However, Concurrent runs much more efficiently on a Compupro or similar multi-user system. The virtual consoles work even better on external terminals, since the central processor no longer has to perform duties such as scrolling the screen. When run on an 80286 processor (which is what I'm working on now), the system is very much more powerful than the CP/M we used to know and love.

For showing how advanced operating system software technology can be applied while maintaining compatibility with market leaders, Concurrent DOS 4.1 was placed on the short list for the Software Product of the Year Award. □

Supplier:

Arcom Pacific, 252 Abbotsford Road, Mayne 4006; (07) 52 9522.

Price: \$499

Software Finalists



Q & A COULD perhaps be described as an integrated package, in the sense that it ties together a database and word processor, though it lacks other facilities such as a spreadsheet or graphing. No matter how you describe it, its capabilities are just those required by a large part of the business computing marketplace.

The system actually comprises five subsystems: File, Report, Write, Intelligent Assistant and Utilities. These are all selected off the main menu, and are loosely coupled; for example, the word processor can merge data from File databases.

At first sight the File module looks very like pfs:File in capabilities (that is, not very powerful at all). Further investigation, however, reveals hidden depths. The system is driven by a forms design, which is painted on the screen and then further defined in terms of field types, sizes and other information. Data types supported include Text, Number, Money, Keyword (a way of supporting multiple keys that is particularly powerful in bibliographic applications), Date and Time fields which support arithmetic, and Yes/No or logical fields.

After a form has been defined, the data-

The jewel in the crown of the package is the Intelligent Assistant, a natural-language query front end for the database side of the package.

base is created and can be updated, edited, searched and manipulated in the ways one normally expects for databases. The search capabilities are quite impressive, with various kinds of wildcard and pattern matching. A table view is also supported, which is reminiscent of dBase's BROWSE command.

The database is not directly programmable, but fields can contain calculated values. A series of advanced features (which the manual just begins to explore) includes: formatting of values (commas, currency symbols, date and time formatting), range validation of input, field initialisation, indexed fields for fast searches, program statements in forms

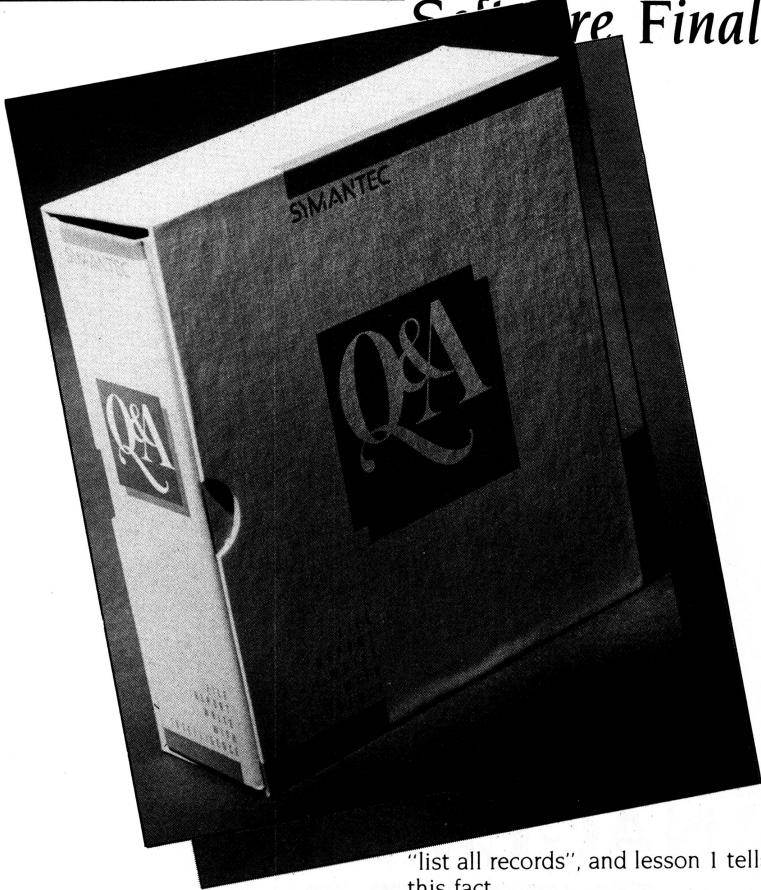
(including expressions, functions and program statements such as IF ... ELSE and GOTO), look-up tables for data entry (such as tax rates), and control of display colours, shading and other attributes.

All this adds up to a quite powerful package, which, while not programmable in the dBase sense, can still be set up to perform sophisticated applications. This is further augmented by a keystroke macro facility, which allows simple sequences of actions to be stored and replayed.

The Report subsystem is a moderately sophisticated report generator, with control over sorting and control break actions (new page, total, average, count, minimum, maximum, subtotal, subaverage and so on), as well as the ability to calculate new columns in the report. Headers and footers are supported.

The Write module is interesting. Again it is, on the surface, extremely limited, but some nice features are hidden away. The screen display shows four lines of status information at the bottom of the screen, including a tab line, menu choices, and file, page and line numbers. The editor is driven by a mixture of function keys and submenus. It supports bold facing, italics

Software Finalists



and underlining, and displays most print enhancements by changing the colour of the text on the screen. An unusual (though increasingly common) facility is the ability to draw line graphics such as boxes in the text (this is also supported in the forms-design mode). Old fogeys will be glad to find the editor also responds to Wordstar control codes, a pleasing recognition that even old-timers do sometimes buy new software.

The jewel in the crown of the package is the Intelligent Assistant, a natural-language query front end for the database side of the package. After construction of a database, the user has to 'teach' the Intelligent Assistant about the database. This requires eight lessons:

- 1 — What the database is about
- 2 — Which fields identify a form
- 3 — Which fields contain locations
- 4 — Which fields contain people's names
- 5 — Alternate field names
- 6 — Units of measure
- 7 — Advanced vocabulary: adjectives
- 8 — Advanced vocabulary: verbs

For example, lesson 1 tells the IA what each record in the database represents; in a personnel database each record might represent a person, individual, employee. The IA must be able to recognise these synonyms for a record. Thus a request to "show me all employees" really means

"list all records", and lesson 1 tells the IA this fact.

Lesson 2 tells the IA which fields it should put in its reports to uniquely identify the records it selects in response to your query: employee surname, first name and ID number might all be required to uniquely identify an individual (person, employee, record).

The more advanced lessons allow the user to do things like express adjectives — expensive, high, young, heavy — for particular fields.

Once the Intelligent Assistant has been taught about the database, it can do your bidding. Select "Ask me to do something" from its menu, and you can type in a request in natural English. Sample queries (and instructions) might include: "Show me the departments and salaries"; "What's John's salary plus bonus?"; "Increase the salary of female employees by 10 per cent"; and "Get the forms for female employees whose salaries are over \$12,000."

As the Intelligent Assistant processes the request, it highlights words in inverse video as it parses them. The parsing process is fascinating to watch; you can almost imagine the machine scratching its head and thinking about what you want done.

Generally, the response to a request is a report, and the Intelligent Assistant will usually give its interpretation of a request before producing the report. For example, in the last request above, the IA asks:

Shall I do the following?

Select and view the forms on which
the sex is FEMALE and
the salary is > \$12,000.00.

Yes - Continue No - Cancel Request

It will then go on to process the database and produce a report.

The Intelligent Assistant is quite powerful; for instance, it understands pronouns in the context of follow-up requests. As an example, after asking "In which department is John Smith?", you can immediately ask "What is his salary?". The IA will also ask for clarification if you are ambiguous.

In operation, the Intelligent Assistant seems considerably more powerful and more bug-free than CLOUD (Conversational Language Optional Utility), its nearest competitor from Microrim.

The Utilities menu permits set-up of the default printer, subdirectories and, most importantly, import/export of data files. Q & A is compatible with: pfs:File, IBM Filing Assistant, Lotus 1-2-3, dBase, ASCII, DIF, pfs:Write, and IBM Writing Assistant.

The program has its drawbacks. First, and possibly most seriously, it requires a lot of memory: 512 Kbytes is mandatory, and even then the use of a DOS device driver or extra buffers will mean 640 Kbytes are usually required. VDISKS are out of the question.

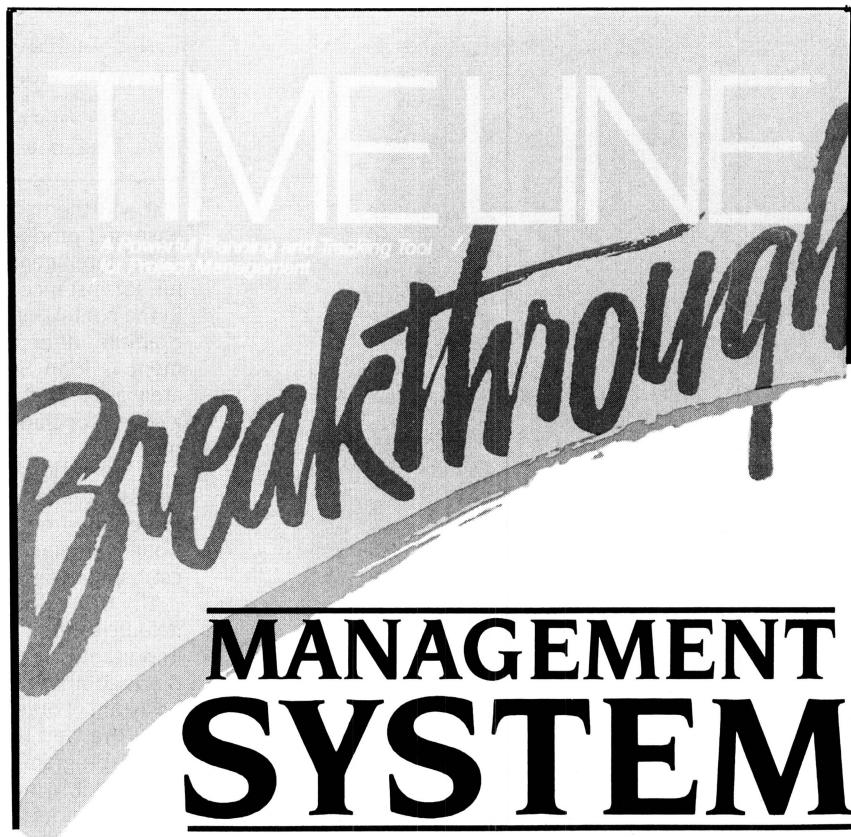
Q & A is also slow. It's a big system, with lots of code, and it performs a good deal of processing before getting down to the real work of database access. You will frequently see a flashing "Working ..." message appear on the screen — this can be frustrating. In addition, the menu-driven structure of the program slows operation. For example, if you press the initial letter of a menu choice (the natural thing to do), you must press return before it is accepted; but if you press 3 for the third entry in the menu list, no return is required. This is the reverse of the fastest operation.

However, Q & A is a program of surprising power, which points the way for further development in natural-language front ends for database systems. Its database is more powerful than it first appears, and its word processor is adequate. □

Supplier: International Solutions, 60 Shepherd Street, Chippendale 2008; (02) 319 1488.

Price: \$598 with RAM card, or \$499 without.

Software Finalists



PROJECT MANAGEMENT on personal computers has boomed over the last couple of years. Most project management packages have fallen into one of two categories: inexpensive, low-powered programs which are highly interactive but not suitable for use on major projects, and expensive, powerful programs which are suitable for large projects, but cumbersome to use.

Recently we've started to see programs which span both camps. An outstanding example in this category is Timeline, a program by Breakthrough Software of the United States.

Timeline is impressive on a number of counts. First, there's its packaging and support. The package includes a welcoming letter from Breakthrough president Bill Lohse, which suggests how to get started with the product; an installation guide; registration card; quick-reference card; and a sheet which describes the 'Actuals-Planned' report (it was too late for inclusion in the manual). There's also the manual itself, which is spiral-bound, with tabs allowing quick access to each section, and a tutorial booklet, entitled 'Adventures in the Vineyards', which shows

With most project management packages, entering dependencies between tasks is a tedious job. With Timeline, it is very simple. Move to the first task and press 1, then move to the second and press 2. Now press the + key, and the tasks are joined.

how a new user can apply the program to running a vineyard. This tutorial is supported by a cassette tape which allows the user to concentrate on the screen, though he or she will need to keep up with the running speed of the cassette (not too fast, fortunately).

The Timeline manual is impressively or-

ganised. Despite its comparatively small size (relative to some recent software packages), it contains a lot of well-organised and comprehensive information. In just over 160 pages, it manages to introduce the product (and its author — nice to see the programmer presented as hero) and explain the basic concepts, introduce the 'forms' concepts on which the product is based, thoroughly document each of the 11 forms, and provide another tutorial and some useful appendices.

The manual also provides some useful marginal thinking along the way, as well as interesting background and historical material, such as the development of PERT (Program Evaluation and Review Technique) and real projects (construction of Cheops' pyramid, space shuttle turn-around). As a result, the manual is interesting to read, although the density of information (this is a large, powerful program) can make it a bit heavy-going at times.

Like most project management programs, the operation of Timeline revolves around an interactive display of a Gantt chart, which shows project tasks as a series of bars against a time scale. How-

Software Finalists

ever, the display can be switched at any time, with just a couple of keystrokes (Alt-F6), into the PERT chart display, which shows the tasks as a series of boxes inter-linked by lines in a network. Due to the limitations of the IBM PC graphics display, all lines are either horizontal or vertical, but the display is substantially the same as that produced by programs such as Macproject.

The PERT chart, however, carries most of the project status, and is most commonly used for obtaining information. Tasks can be entered either as fixed date tasks, which will occur at a predefined date; as ASAP (as soon as possible) or ALAP (as late as possible) tasks, which are dependent on the timing of the tasks to which they are joined; or as 'span' tasks, which float between two other tasks. ASAP tasks shift according to the duration of the preceding tasks, so that late completion of a prerequisite task, for example, will cause an ASAP task to start later.

With most project management packages, entering dependencies between tasks is a tedious job. With Timeline, it is very simple. Move to the first task and press 1, then move to the second and press 2. Now press the + key, and the tasks are joined. The F7 key (Show Joins) highlights the tasks to which the currently selected task is joined, making it easy to track the project.

Most of the Timeline commands (there are surprisingly few for such a sophisticated program) are selected from a menu structure which is modelled on Lotus 1-2-3. The program will therefore be familiar to most users before they even start.

Like a Symphony

Data entry, such as task details, is accomplished through forms which open on the screen rather like windows. In fact, the screen forms look rather like Symphony sheets. Once entering and editing data through forms have been mastered, the user should be able to explore the entire program with ease.

The forms allow entry of overall project data, names and costs of resources (up to 16 resources per project), calendar details (working hours, holidays and so on), display control (time scaling, format and the like), filtering of displayed tasks to highlight those that match certain criteria, and of course details of tasks themselves (type, duration, status, resources required and other data).

Timeline has some particularly advanced facilities. For example, a form of

partial join is supported, which allows one task to be started before its predecessor is completely finished. It also allows task splitting: if you discover a project simply cannot be brought in on time with the current resources, one solution is to split tasks in two and apply double the resources to complete them in half the time.

Timeline also offers spreadsheet-like 'what-if' analysis, through its automatic recalculation and the 'undo' key, which allows you to restore the project to the way it was with one keystroke. Of course, if you want to perform analysis of project costs, perhaps graphing them, Timeline allows for the export of data to Lotus 1-2-3 and Supercalc 3, as well as printing of reports to disk for further editing by a word processor (these facilities are provided on an extra diskette which is obtained by returning the product's registration card).

Large projects can be split up into smaller, inter-related projects which are then tracked by using multiple schedules. A subproject is inserted into the Summarise field of a task form, and Timeline will

now recalculate the subproject's duration and import that detail into the master schedule.

A variety of reports is available from the program; these include the regular Gantt chart, as well as the PERT chart. A Cost report shows all task and resource costs summarised weekly or monthly, or over the entire project. The Status report shows tasks scheduled for today and this week, while the Detail report shows all the information for each task, including all details defined in the task form.

Timeline impresses as a program that has been well thought-out, with advanced features that are well documented and consistently managed within the software. The documentation and support material are excellent and contribute extensively to the utility and usability of the package. □

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Software Finalist



-NEWS- ROOM

NEWSROOM IS an interesting program for the IBM PC, Apple II and Commodore 64/128, which allows schools, businesses or other organisations and individuals to create newsletters or virtually entire newspapers with surprising quality.

While there has been a lot of activity in this area recently, particularly around the Macintosh, Newsroom is attractive because of its low price and relatively high performance on inexpensive hardware.

The program consists essentially of six separate modules. The first (at least in order of introduction in the manual) is the Banner, which allows the user to create a banner to go at the top of the first page of the publication. This usually consists of some type in one of five available fonts, together with some accompanying illustration, either hand-drawn or loaded from the disk full of clip-art supplied with the package.

The illustration is built up in a window on the right half of the screen, while down the left side is a series of icons: a framed face represents the clip-art library; a flip icon (two arrows) allows clip-art to be left-right reversed; a crayon icon is used to access the graphic tools window and allows freehand drawing and typing; while a magnifying-glass icon provides facilities similar to the Macpaint 'Fatbits' option. Other icons allow work to be erased, saved in files, and undone.

The Photo Lab module allows creation of freehand line-art images either from scratch or by modifying clip-art. Its facilities are basically the same as in the banner section, with the additional ability to 'crop' photos to select part only of an image.

The Copy Desk allows you to work on one area of a page, called a panel. Depending on the page size, there can be

Recognising that Newsroom is unlikely to be used by professional journalists, the manual is split into two sections, the first detailing the program's operation and the second covering the background information necessary for creating a paper.

eight or 10 panels on a page, and if a banner is used, it occupies the space of the top two panels. Panels can contain photos and text, and since the page has two columns of panels, this allows two-column layout of text and graphics. In effect, the copy desk is a word processor with the ability to paste graphics into place.

The Layout Desk is used to put the entire page together from the panels and banner which have been saved to disk. As you move the cursor to the panel you wish to fill, a list of panel file names appears and you can simply select the one that should go in that position.

The Print Room module basically prints pages on an IBM Graphics, Epson or similar printer. It can also print individual panels, banners and photos.

Finally, the Wire Service module is a special-purpose communications utility which allows machines running Newsroom to transmit and receive files. It is

menu driven, with a set-up menu listing a variety of United States modems, and works completely automatically for the receiving machine.

By using these various facilities within the program, some quite attractive layouts can be achieved.

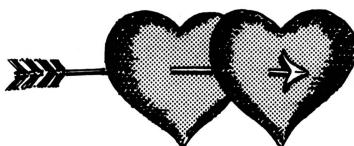
Incidentally, the manual is one of the strengths of the package. Recognising that Newsroom is unlikely to be used by professional journalists, the manual is split into two sections, the first detailing the program's operation and the second covering the background information necessary for creating a paper. Topics covered include: organising staff, topics to write about, editorial content, how to interview, research techniques, layout tips and more. Much of the information would be of most use to kids producing a school paper, but the tone is not at all patronising and adults will have no difficulty with it.

Appendices include a bibliography, proofreaders' symbols and an overview of the clip-art disk contents (aliens, bears, beasts, birds, bugs, ... women, words, workers), and some tips for newspaper visual design.

The program is fun to use, although its icon/menu command interface can be a bit slow for experienced users. It has a distressing tendency to hang onto an IBM PC or AT, not allowing the user to exit, but there were no problems in operation within the program.

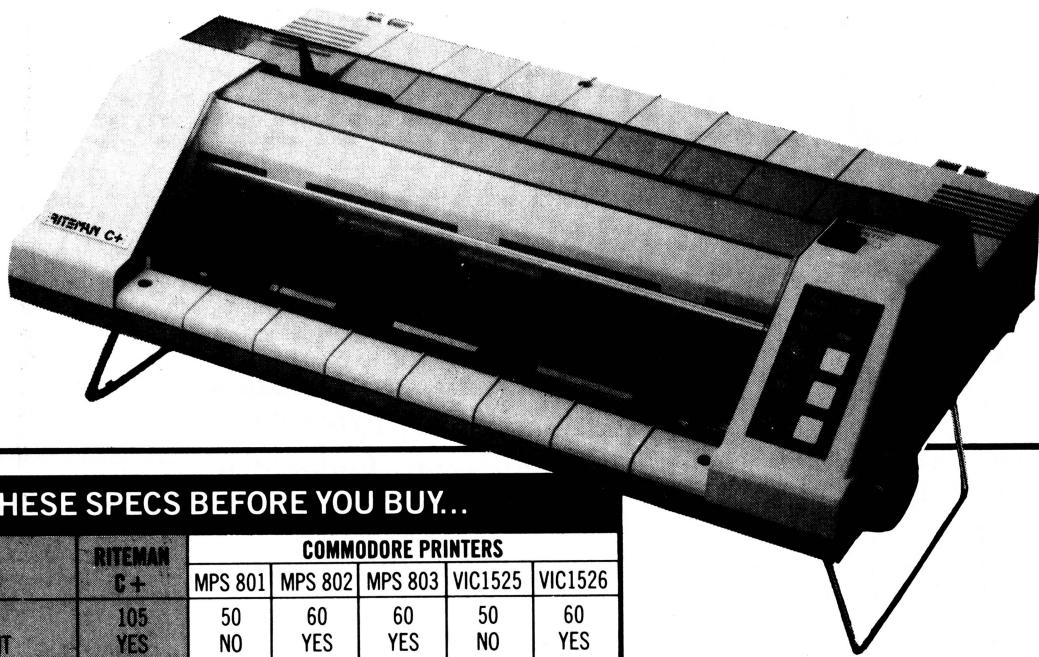
Overall, Newsroom is quite an impressive program, particularly bearing in mind the price. □

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40 CHARACTERS PER LINE	YES	YES	YES	YES	YES	YES
80 CHARACTERS PER LINE	YES	YES	YES	YES	YES	YES
66 CHARACTERS PER LINE	YES					
132 CHARACTERS PER LINE (PAPER HANDLING)	YES					
FRONT LOADING FOR EASY PAPER SETTINGS		YES				
BUILT-IN PRINTER STAND		YES				
PRINT ON POST CARDS (SOFTWARE COMMANDS)		YES				
DOUBLE STRIKE		YES				
EMPHASIZED		YES				
COMPRESSED		YES				
UNDERLINE		YES				
SUPER/SUBSCRIPTS		YES				
ITALICS		YES				
DOUBLE DENSITY BIT IMAGE (CHARACTERS)		YES				
9X9 FONT		YES				
TRUE DESCENDERS		YES				
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the GREAT AUSTRALIANS

When we introduced our Special Commendations for Australian hardware and software in 1984 we elected not to put a time limit on the launch of potential contenders — the locals needed longer to 'get their act together', we reasoned.

We said lack of experience and, sometimes, budgetary constraints prevented the local manufacturers from matching their overseas counterparts. They needed to be given longer after a product's launch, to develop it fully and establish it in the marketplace.

It didn't take them long to prove us wrong — all this year's finalists were released in 1985, and several of them came close to making the short-list for the major awards...

Australian Hardware

The decision here was particularly interesting, not to mention difficult, as all but one of the short-listed competitors were finalists in previous years, and two of them were winners!

Labtam was a finalist last year with its 8086-based desktop machine, the 3003. This year, it has released its new 32032-based Unix machine, which represents over a million dollars' worth of research and development. While this high-performance machine is well over the top end of the personal computer market, it is nonetheless a significant machine for the local computer manufacturing industry.

Microbee Systems won the inaugural award for its popular machine. Two years on, the company, and the computer, have gone from strength to strength, chalking up massive international orders. The latest versions represent some of the best-

value purchases on the Australian market.

Netcomm won last year's award for its innovative PC In-Modem, which offered Hayes Smartmodem compatibility in a CCITT-type modem. The latest modem from Netcomm, the 1234, provides even higher performance — up to 2400 bps full

We said lack of experience and, sometimes, budgetary constraints prevented the local manufacturers from matching their overseas counterparts... It didn't take them long to prove us wrong — all this year's finalists were released in 1985.

duplex — in a small external box.

The only 'beginner' in our Australian hardware section was Impact Systems, whose Laser printer was originally dismissed from the deliberations because the judges thought anything that good, released as early as it was, must have been an import. However, it turned out Impact's foresight was as good as its engineering — the all-Australian design (built on Canon mechanicals with local electronics) not only showed up some of the international opposition, it beat them to market here.

After extensive deliberation, it came down to a close decision between the Im-

pact and the Labtam. The verdict? This time, the honours go to Labtam for its new supermicro. Having shown that an Australian company can be virtually the first in the world to release a machine based on a new chip, and that it can port Unix to it, Labtam has given the rest of the Australian manufacturers a lesson in good hardware and systems design.

Australian Software

After examining the software released by local companies during the past year, the panel settled on a short-list of three products:

- Complete PC Tutorial
- dToolkit
- JAM Appointment Diary

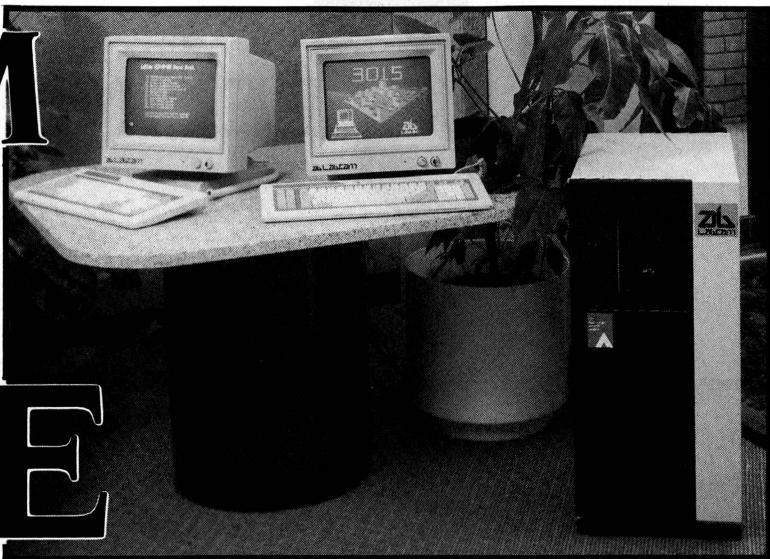
Intouch Computing's Complete PC Tutorial is a co-resident program which instructs the user in DOS usage and programming, while still leaving DOS and other programs active on the PC. This is a new concept which Intouch can exploit further.

dToolkit is a collection of handy routines for dBase II programmers. Adding features such as file security, date handling, soundex codes and other advanced techniques to a versatile database system, it adds life to dBase II systems.

JAM Software's Appointment Diary system for the Macintosh is simple to use, yet surprisingly powerful, due to a clean design which avoids the pitfalls of making software over-complex. Since it is a co-resident desktop accessory, it is always available.

To the panel, it seemed that the Complete PC Tutorial was the product which offered the most innovation and scope for expansion, particularly for export sales. □

LABTAM at LARGE



LABTAM's desktop 8086 didn't make it to the Australian Hardware Award of Merit last year, but the company is back again this time with a completely new machine, the 3015/V32. Very few of our readers are likely to buy one of these, since it's definitely not a personal computer. However, one of the purposes of the Award is to encourage Australians doing good work in computing, and the 3015/V32 can definitely be described as good work.

The 3015/V32 is one of the first computers in production in the world to be based on the National Semiconductor 32032 processor. For those not used to reading part numbers as easily as the afternoon tabloids, the 32032 is a true 32-bit processor with features for supporting advanced multi-user, multi-tasking operating systems such as Unix, and a performance of approximately 1 MIP (million instructions per second). That puts the 32032 in the same class as the CPU of some superminicomputers, such as the Digital Equipment Corporation VAX 11/780.

The 3015/V32 is a tower enclosure, not much bigger than many PCs. Internally, it has an Intel Multibus connector system for input/output boards, and a proprietary connector called X-Bus for fast memory access. There are three processors in the system: the 32032 itself, an 8086 for video control of the system console, and either a Z-80 on early models or a 68000 on later machines as a hard disk controller. The CPU board also carries an NS32081 floating-point co-processor, which will speed floating-point-intensive computations.

Peripherals in the enclosure include a 67 Mbyte hard disk, 20 cm floppy disk and a 45 Mbyte back-up tape drive.

Coming soon is the 80186, yet another

Labtam staff completed its own Unix port which, according to those who have evaluated the machine, is very clean. Labtam is also porting software onto the machine, a task which typically takes two days for even quite major software systems.

processor, on an intelligent serial communications board, which will handle eight terminals while hardly bothering the main CPU. Also in the pipeline is an SMD drive controller, which will handle a 550 Mbyte disk drive (you can see by now this is not a PC, right?).

The system console, which is based on the memory-mapped video architecture of earlier Labtam machines, supports two planes of 800 by 300 pixels for high-resolution graphics. Graphics software provides emulation of a subset of DEC's VT-52 REGIS graphics. The screen can also be placed in 132-column text mode.

The smallest system has 2 Mbytes of main memory (any less would cramp the style of the Unix operating system), while maximum memory is currently 12 Mbytes. At the current clock speed of 10 MHz, the overall system performance benchmarks somewhere between a VAX 11/750 and an

11/780. With an upgrade to the 32332 (a new 14 MHz processor), performance should be well in excess of the 780 (roughly 3 MIPs is the forecast).

Labtam staff completed its own Unix port which, according to those who have evaluated the machine, is very clean. Labtam is also porting software onto the machine, a task which typically takes two days for even quite major software systems. Already available are Uniplex (an office automation package which includes electronic mail), word processing (claimed to at least match Wang standards), a spreadsheet, and an SQL-type database (a close cousin of Informix).

Also available are the Unify database system, Today (BBJ's Australian-developed fourth-generation language) and Tetraplan (an accounting system which also includes additional modules for applications such as project management). Of course, there's also a selection of scientific and technical software for the machine.

The development of the 3015/V32 was a one-year, one-million-dollar project. It's manufactured at Labtam's Melbourne plant, and already some 60 machines have been sold to academic (Queensland and Sydney Unis) and government (the Department of Aviation) users. Approximately 70 per cent of Labtam's business is in exports, so the future looks rosy for sales of this machine.

At a basic price of around \$50,000, this machine won't be on everyone's shopping list. But there is a surprising number of businesses, universities and government departments looking for a machine in this range, and it's good to see an Australian company able to provide it. □

THE BEELINE TO SUCCESS

Microbee Systems says the new machines answer all the complaints, suggestions and wishlists from owners all over Australia. A wide range of former options is now included as standard, making them some of the best-equipped small computers around.

TWO YEARS AGO Applied Technology took our first Special Commendation for Australian hardware "in recognition of the continued development of the Microbee to its current sophisticated level, for continuing to offer excellent value for money, and for unparalleled success in the domestic and export markets".

The company, now Microbee Systems, deserves credit this time around for exactly the same reasons — the machine has undergone significant development, it still represents great value, and its domestic and export success continues to snowball.

More than 60,000 Bees have been sold, and recent new developments should ensure a rapid increase in that figure.

Acorns to Oaks

Today's Microbee buyer would have trouble recognising the original machine, either externally or internally. The \$399 do-it-yourself kit supplied four years ago had an ungainly squared-off plastic case, BASIC in ROM, 16 Kbytes of RAM, a 64 by

16 video display and a simple low-cost keyboard.

By the time we gave the Microbee its special commendation it featured an editor/assembler and a word processor in ROM (as well as Microworld BASIC), and came in several models ranging from 16 Kbytes to 128 Kbytes. The larger machines featured disk drives and bundled software like Multiplan and Wordstar.

If that was a step up from the original, today's machine is a leap. The latest release, the Premium Series, has only a few components in common with the first Bee.

Microbee Systems says the new machines answer all the complaints, suggestions and wishlists from owners all over Australia. A wide range of former options is now included as standard, making them some of the best-equipped small computers around.

Standard items added in the past two years, such as the built-in communications software and a 'friendly' icon-based user interface, have been improved, while a host of new features has been added.



They have real, built-in colour in place of the tacked-on optional extra of their predecessor, and come with eight times the graphics capacity of the standard model. PCG graphics capability can be doubled again (to 32 Kbytes) if needed.

There is now no screen flickering, there are minimal wait states, and colour changes are available on a character-by-character basis. There is a selection of 16 foreground and 16 background colours.

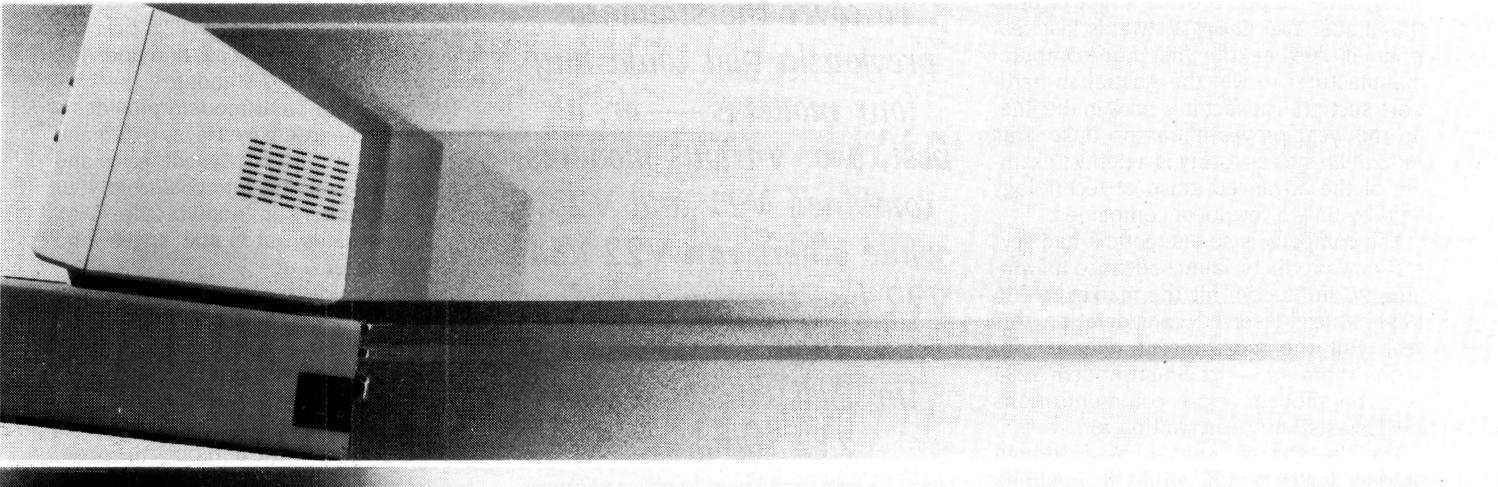
The previously optional Viatel capability is built in, and cursor-control keys have been added to the otherwise standard keyboard. A volume control is provided for the first time.

The base model comes with 88 Kbytes of ROM with built-in programs covering word processing, spreadsheet and database applications as well as BASIC, communications and a calculator. □

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WHAT A SMARTMODEM!

NETCOMM helped provide a new facet to the annual *Your Computer* awards last year when it became the first non-computer manufacturer to win the Australian hardware section. The fact it is back in the line-up this year proves it was no fluke. This Australian success story is a perfect example of the advanced grasp of technology held by only a few local companies.

The company is so energetic it had several new products, launched since its winning PC In-Modem hit the market late in 1984, which deserved consideration this year. But the most recent release outshone them all — its Smartmodem 1234 was the modem most communications enthusiasts had been waiting for.

The In-Modem was a breakthrough product for communications in Australia — after years of enviously watching American PC users with their intelligent auto-dial, auto-answer modems, local users finally had their own smart modem which conformed to the CCITT standards in use here rather than the US Bell standards.

And because it followed the 'industry standard' Hayes command set (established by market leader D C Hayes with the original Smartmodem) it was compatible with a wealth of existing communications software which knew how to 'drive' the modem for the user.

Smartmodems All . . .

Now comes the Netcomm Smartmodem 1234, a unit which provides all the features of the Hayes Smartmodem — at speeds up to 2400 bps (bits per second) — as well as meeting CCITT and Bell standards. (Incidentally, while it's smart

To cover the standards previously you could buy four modems — or, at best, two. Various modems combined V21 and V23, while others ran V22 and V22 bis; the Smartmodem runs them all, and adds the Bell 103, 202 and 212 standards.

marketing for Netcomm to call its unit Smartmodem, we feel it's a little cheeky to have registered it as a trademark . . .)

The beauty of the Smartmodem 1234 is the fact it combines all the common standards into one unit. Common modem standards in use here are CCITT V21, at 300 bps (supported by virtually all bulletin boards and dial-in databases), V23 at 1200 bps half duplex (which provides communication at 1200 bps in one direction and 75 in the other, and is typically used on videotex systems such as Viatel), V22 at 1200 full duplex (1200 bps in both directions, supported by some bulletin boards and most dial-in services) and V22 bis at 2400 bps full duplex (only now starting to see more than limited usage).

To cover these standards previously you could buy four modems — or, at best, two.



Various modems combined V21 and V23, while others ran V22 and V22 bis; the Smartmodem runs them all, and adds the Bell 103, 202 and 212 standards.

The Netcomm Smartmodem provides a superset of the extensive Hayes command set, can operate in both synchronous and asynchronous modes, lets you store your set-up parameters in non-volatile RAM, and incorporates automatic speed and data format sensing.

On the PC side, it automatically detects the speed you are using to communicate with it and adjusts. On the line side, it recognises the speed of the answering (or calling) modem and issues a message to the user's PC (such as CONNECT 1200) before switching to the appropriate speed.

A Minor Moan

This gives rise to one of only two complaints we have about this otherwise brilliant unit: life would be much simpler if it could maintain separate speeds on the line and user sides, rather than requiring the user to switch to the connect speed. Naturally, this isn't much of a problem for personal use, but if you want to leave the 1234 in unattended auto-answer mode you have to have sophisticated software to handle the speed change. Telecorp's Tulpi modem shows how well this dual-speed operation can work — we would expect a similar solution from an innovative and technically advanced organisation like Netcomm.

Our other complaint? A weird 'copy-protection' scheme which comes with the modem. You have to use the supplied disk (which also contains a sophisticated communications program) to 'initialise' the modem before it will work. The only problem is, you have to have an IBM-compatible machine to run it — pity those people mentioned in the 1234 manual who can use it with "any PC with a normal serial port or any basic interactive terminal".

Why this scheme is necessary (unless it's actually a disguised copy-protection scheme for the software on the disk!) is way beyond us . . . □

Supplier: Netcomm, PO Box 284, Pymble 2073; (02) 888 5533.
Price: \$1810.

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```

RD  READ "NAME: ",NAM,! QUIT:NAM=""  

    IF NAM'??2.A1","1A.E WRITE "PLEASE ENTER AS LAST,FIRST MI",! GO RD  

TEL  READ "TEL # ",TEL,! IF TEL'?3N1"--"4N WRITE " NNN-NNNN PLEASE",! GO TEL  

    SET ^DATA(NAM)=TEL GO RD  

PRT  WRITE "      NAME",?20,"TELEPHONE #",! SET NAM=""  

LP   SET NAM=$ORDER(^DATA(NAM)) QUIT:NAM=""  WRITE NAM,?20,^DATA(NAM),! GO LP

```

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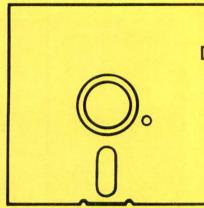
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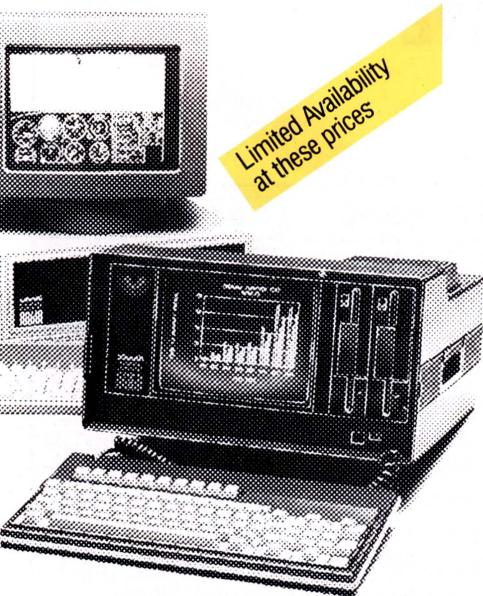
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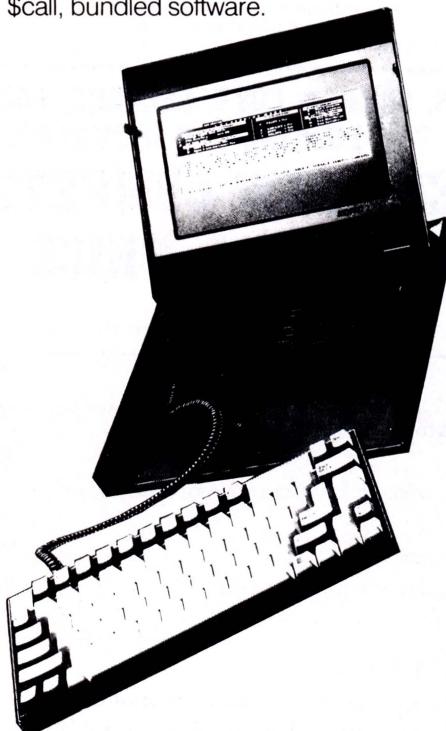
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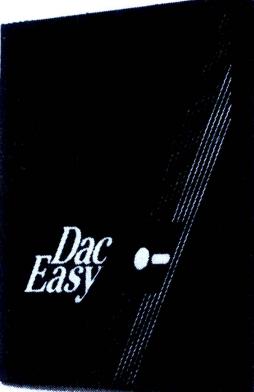
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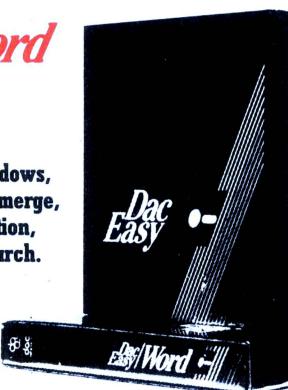
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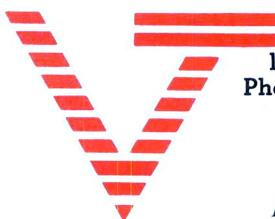
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WHEN IMPACT SYSTEMS' Laser 800 was first suggested as a contender for the Australian section of the awards, most of the judges couldn't believe it was a local product.

It had 'landed' on the Australian scene so early, and was such a good product, that they assumed it was an import.

The Impact was the first of the Canon-based desktop laser printers to appear at local shows, which says a lot for the foresight and research and development capabilities at the company's Chatswood (Sydney) headquarters.

Specialists in printer interfacing, the company picked up on the laser development very early in the piece — and assumed most manufacturers would limit their machines to a single command set, or perhaps provide an emulation of a popular printer such as the Diablo or Qume.

It was an accurate assumption, and the developers' feeling that the market would appreciate an 'easier-to-drive' laser proved just as accurate. They set out to provide multiple emulations and an advanced basic configuration, and did a fine job of it.

Upstaging Hewlett-Packard

Impact's most successful — and spectacular — move was offering its interface as an 'upgrade' for Hewlett-Packard owners. While it might have seemed a little cheeky, it brought home to a lot more people just how good this local product was.

And it isn't just patriotism that makes the Impact laser a success story — the company has just signed export deals for England, France, Germany and Holland. It is also exporting its technology (that is, manufacturing rights rather than finished products) to the United States.

Readers who saw our laser printer run-

It isn't just patriotism that makes the Impact laser a success story — the company has just signed export deals for England, France, Germany and Holland.

down in the YC Yearbook, published in January, will know we have some complaints about the Impact — for example, some of the fonts are no better than mediocre — but overall it has the best features-per-dollar ratio of the desktop lasers.

It has the widest range of emulations (HP Laserjet, Qume, Diablo and Epson) plus its own command set, all in straight printable ASCII characters so you don't have to worry about how to send it control characters from your favourite word processor. You can put any printer commands in the middle of your text and see an immediate result.

The best part of this feature is the fact the standard command set is available no matter what emulation you have selected — so you can add other commands (such as its line- and box-drawing/shading com-

mands) within a word processor configured to drive, say, a Diablo.

Utility and Versatility

Items like the programmable control panel (with 16-character liquid-crystal display), non-volatile memory for storing set-up parameters, and provision of both serial and parallel interfaces make the Impact a superbly practical machine.

And even if we don't like a few of the fonts, you get more of them (and can do more with them) than on most of the low-cost desktops. Six fonts are provided in ROM on the Model II (four on the Model I), and they are downloaded into 15 font areas in RAM.

Along the way any of them can be widened, enlarged, italicised, made bold or rotated, giving the user an enormous range of type styles to choose from. Any of the faces can be used in both portrait and landscape mode.

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Supplier: Impact Systems, 7 Gibbs Street, Chatswood 2067; (02) 406 6611.

Price: \$6300 for the basic (full-featured) unit; \$6900 with extra fonts; \$9900 for a machine designed to handle barcode applications; \$11,600 for the do-everything graphics machine designed for CAD/CAM use; \$995 for the Impact conversion to the HP Laserjet.





d TOOLKIT

dBASE PROGRAMMERS often find themselves wishing the language had extra functions: soundex codes, date conversions, that kind of thing. They also find themselves doing the same kind of work repeatedly: setting up menu systems, for example.

Help is at hand, in the form of dToolkit, a collection of useful routines written by Lyle Braidwood, a dedicated dBase hacker, to solve his own problems. There's a good chance they will solve other users' problems too.

dToolkit is actually a collection of five separate libraries and programs: dLibrary, dMenu, dFix, dCrypt and dBASIC.

The first, dLibrary, is a collection of useful assembly language routines which can be called from within dBase to perform useful functions at high speed. These include data compression, random number generation, square roots, soundex codes, check-digit generation, lower-case conversion, arrays, provision of an extra 256 memory variables, encryption, character class testing and conversion, amount in words and more.

These are the kind of functions which are either impossible or difficult (read slow) to write in dBase, and which many programmers would simply not attempt. Having them available brings more complex applications within the grasp of us mortal programmers.

Most dBase users will have had occasions when the system corrupts a database file, inserting an end-of-file marker in the middle or inserting corrupted data into the database file header. dFix gets around these problems quite adroitly.

dMenu is a menu front-end generator for dBase II programs. It will handle up to 38 levels of menus with eight levels of security and password protection. Using this scheme, clerical users can be forbidden access to the managerial reporting elements of a system, while a super-user can have the full freedom of the system.

dFix is a dBase file fixer. Most dBase users will have had occasions when the system corrupts a database file, inserting an end-of-file marker in the middle or inserting corrupted data into the database

file header. dFix gets around these problems quite adroitly.

dCrypt is a fairly simple file encryption and decryption utility, which provides a minimal level of security for databases. While it will prevent unauthorised access to data, it cannot prevent damage or erasure; nor will it stop an unauthorised user from encrypting the file so authorised users are denied access.

dBASIC is a collection of routines written for the CBASIC compiler, which provides access to dBase databases and indexes from that language. Being compiled, CBASIC is much faster at complex tasks which are not file-bound, such as the production of complex reports; nor is it restricted to having only two files open at once, as dBase is. This makes it a good candidate for these tasks, but of course, before dBASIC came along, programmers in CBASIC could not get access to dBase files.

dToolKit is a particularly interesting piece of software in that it was written by someone who uses dBase often to satisfy real needs. It is particularly useful for the small commercial software developer. □

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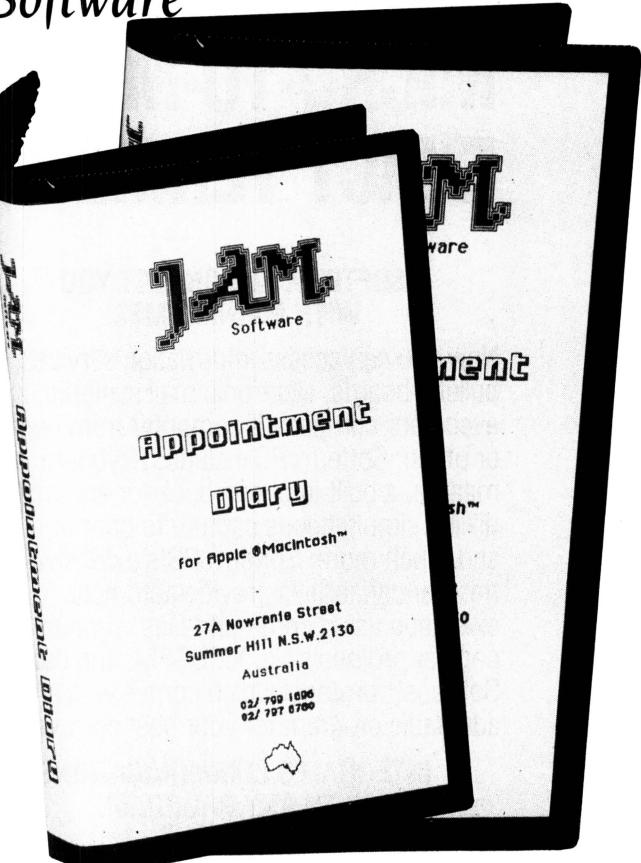
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JAM IT!



THE MACINTOSH Toolkit provides a fascinating environment for programming, allowing the creation of quite versatile applications without enormous amounts of programming effort being expended on the user interface code — the toolkit takes care of the creation of dialogue boxes and the like.

An Australian company, JAM Software, has taken advantage of this and entered the fray with a product which is not quite unique but certainly of almost universal application, and which performs its function in a simple and elegant way.

The JAM Appointment Diary is a Macintosh desktop accessory — that is, it loads into memory from the system disk and is instantly accessible in the same way as the notepad, calculator, control pad and other goodies.

Installing the program is simply a matter of using the Font/Desktop Application Mover to copy the application to the system disk. Once there, it appears on the Apple menu and can be accessed in the usual way.

When activated, the diary brings up a window labelled Appointments which displays the current date and time at the top and two months' calendars on the left side of the page. The current date will be highlighted on the first calendar. The user's name (there can be up to nine users — ideal for a secretary) appears at the bottom of the page.

To move to a month that is not displayed, click on one of the dog-ears (the turned-back corners) of the month displays.

Similarly, the year is displayed in a dog-eared box, so navigation through the years is handled in the same way.

The right of the page is a free-format text-editing area, just like the notepad, in which short reminders can be typed under whatever headings the user wishes: say, Meetings, Phone, Shopping — whatever.

Clicking on any other date shows appointments and reminders for that date. To move to a month that is not displayed, click on one of the dog-ears (the turned-back corners) of the month displays. Similarly, the year is displayed in a dog-eared box, so navigation through the years is handled in the same way.

A menu option labelled 'Auto Layout'

allows a template to be designed for the text area of the window to automatically incorporate the same layout on each date/page. This is useful in jogging the memory when planning activities.

In essence, that's the whole thing. Obviously, one can operate on the size control box of the window and the scroll bar of the text area, and of course one can switch between up to nine users' appointment files. But it's the essential simplicity of the program which is its strength and its great attraction.

Some calendar programs for the PC (and the Mac, for that matter) go overboard on features and become difficult or cumbersome to use. The result is, quite simply, that they mostly aren't used.

JAM Software is to be congratulated on resisting the temptation to add more features. Printed appointment listings, for example, would be tempting to add — but since this is an immediately accessible personal accessory, there should be no need for such listings.

All in all, the JAM Software Appointment Diary is a well-thought-out accessory that will add to the value of any Macintosh. □

Supplier: JAM Software, 27A Nowranie Street, Summer Hill 2130; (02) 799 1696
Price: \$39.95

THE COMPLETE PC TUTORIAL

THE COMPLETE PC Tutorial is a unique product in the world of IBM PC software. There are many examples of co-resident software, such as Sidekick, Smartkey and others; there are also lots of tutorial programs for various packages including DOS, but there is nothing which combines both techniques to run at the same time as the target application.

Each lesson in the tutorial (there are 20 of them) is a separate program. When loaded, the program brings up a coloured window (on a CGA system) at the bottom of the screen which, in the first lesson, introduces the system.

In essence, the program intercepts keystrokes before DOS gets to see them, and if they are intended to control the tutorial, it simply acts on them, rather than passing them back to DOS. If the keystroke is intended for DOS, then the tutorial program passes it through, and everything behaves normally.

The window at the bottom of the screen contains instructions to the user. Generally, to move to the next page of the tutorial, the user simply presses the Ctrl,

vanced, and progresses to programming. Some time is spent on BASIC, and then it's on to assembly language programming, first using Debug and then MASM (the Microsoft Macro Assembler).

Pretty soon we're being introduced to the graphics facilities of the IBM PC, then DOS functions, interrupts and finally speaker and keyboard control. By the end of the tutorial, the program has revealed most of the secrets of how it works!

The material is paced on the quick side. There is absolutely no way you can gloss through it and come out understanding it all. On the other hand, if you are willing to work through the exercises, modify the example programs and really *think* about what's going on, you will learn one hell of a lot.

If I were Intouch Computing, I know what I'd be doing: producing similar tutorials, as fast as possible, for the most popular products: Wordstar, Lotus 1-2-3, Multimate, dBase III. The number of people out there who want to learn to program in assembler is not that large, but the number of baffled would-be 1-2-3 users is much larger again.

The program does have some minor annoyances. It was obviously developed on a clone, not a PC, since there are references to red lights on the Caps and Num Lock keys, and the assumption is made that MASM is supplied with the system (not so for the PC). There's also reference to a DOS FORMAT /O option, which is not present in PC-DOS.

More important, however, is the inbuilt assumption that the program will be run on a two-drive PC — many corporate users, who could really get a major benefit from this program, will run it on an XT.

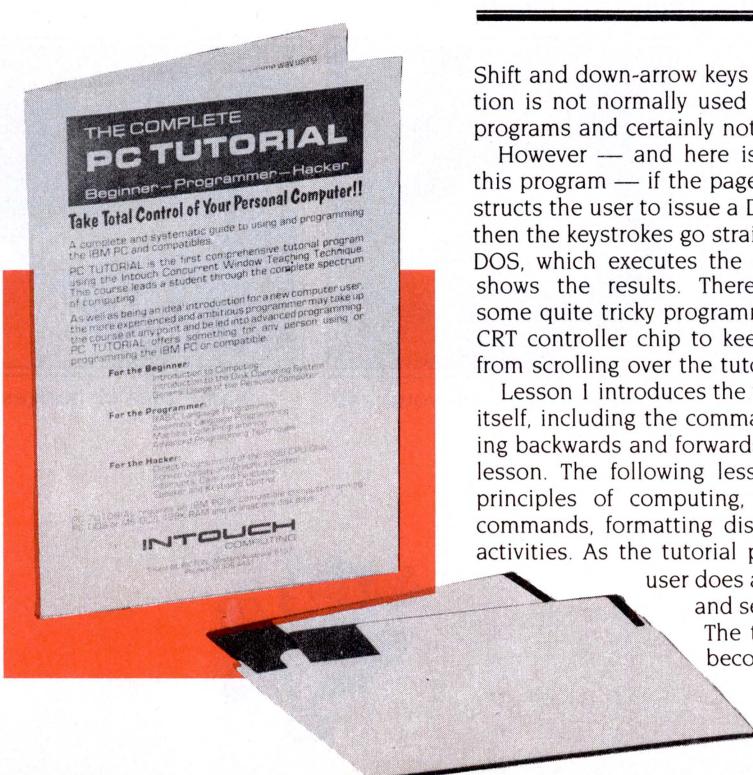
These are only minor annoyances. The basic technology of the program is based on a quite startlingly simple idea. If Intouch grabs it and runs with it, to produce even more tutorials in this vein, it has a definite winner. It's certainly the best all-round introduction to the PC I've seen. □

If I were Intouch Computing, I know what I'd be doing: producing similar tutorials, as fast as possible, for the most popular products: Wordstar, Lotus 1-2-3, Multimate, dBase III.

Shift and down-arrow keys (this combination is not normally used by application programs and certainly not by DOS).

However — and here is the secret of this program — if the page of tutorial instructs the user to issue a DOS command, then the keystrokes go straight through to DOS, which executes the command and shows the results. There is obviously some quite tricky programming of the PC CRT controller chip to keep DOS output from scrolling over the tutorial window.

Lesson 1 introduces the tutorial system itself, including the commands for scrolling backwards and forwards through each lesson. The following lessons cover the principles of computing, the key DOS commands, formatting disks and similar activities. As the tutorial progresses, the user does all these things and sees the results. The tutorial rapidly becomes more ad-



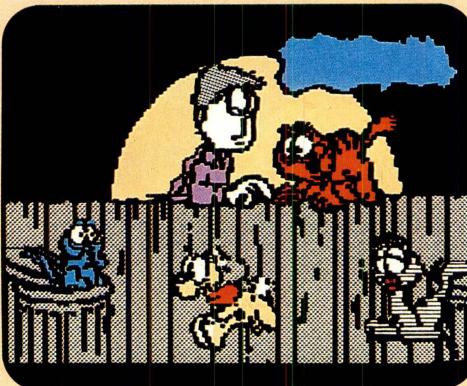
Supplier: Intouch Computing, 1 Kent Street, Bicton 6157; (09) 339 4431.
Price: \$69.95.

HERE'S WHERE THE FUN BEGINS.

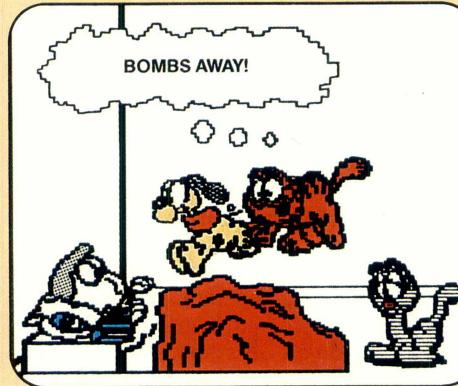
CREATE WITH GARFIELD!

* See Picture	Special Artwork
Get Background	Data Disk
Get Stick-ons	Cartoon Printer
Erase Stick-ons	See Instructions

SPACE BAR — move * RETURN — choose



It's easy! The GARFIELD menu screen gives you all the options you need to create your own comics.

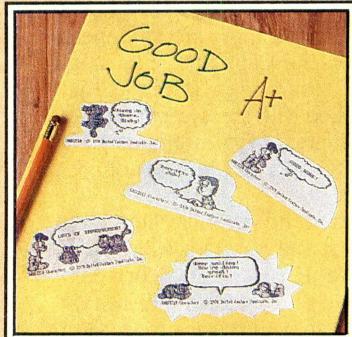


It's up to you! Choose the characters, backgrounds, and props, just as a cartoonist does.

It's fun! Create humorous situations with your favorite characters, then write funny lines for them, too.

The many uses of Create with GARFIELD! are limited only by the imagination.

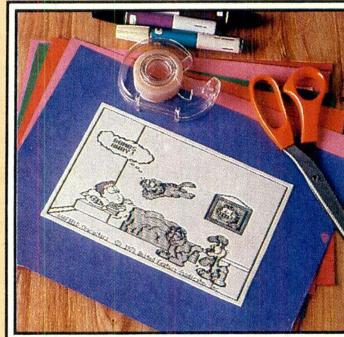
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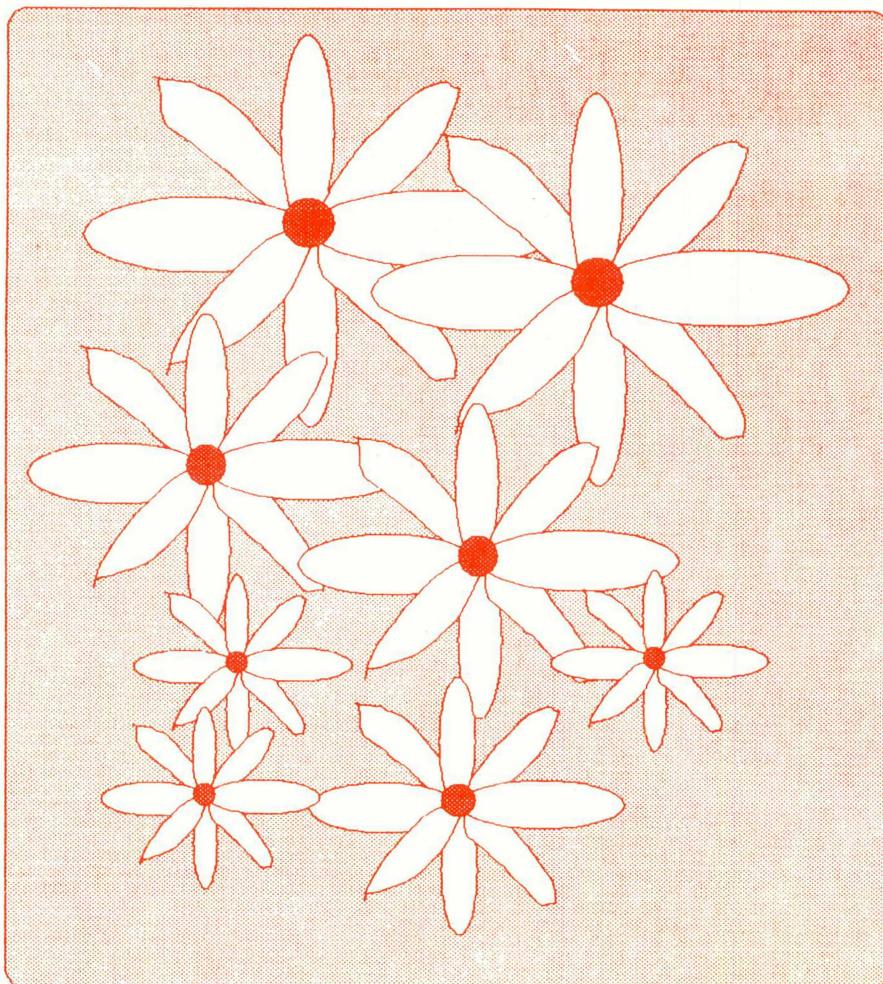
LOOK AT ALL
THE WONDERFUL
THINGS
I CAN DO.



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THE RISE AND FALL OF A>

It's probably a sign of age these days if you even know what the title of this article is talking about. Tim Hartnell ponders the fall of A> and the rise of Macs, GEM and their ilk, and draws a few reluctant conclusions about the future.



It began with rumours that the Macintosh would soon be running scared. Digital Research had developed a Mac-like front end, we were told, which meant any computer running MS/PC-DOS (like the ubiquitous IBM PC) would soon compete with the Mac on its own ground.

The computer for the non-IBM brigade had suddenly become the model which the rest of the computer world could copy. Digital Research had developed a program called Graphics Environment Manager (GEM) which would give many computers an operating environment that appeared to be very similar to the Macintosh, using a mouse to manipulate icons representing disks, files and menus.

Apple co-founder, Steve Jobs, who is generally (and erroneously, claim a few Apple employees) credited with masterminding the whole Mac concept, may have thought that was bad enough, but he probably suffered a few sleepless nights when he heard about the 'Jackintosh'.

Jack Tramiel founded Commodore, and with a brusque management style which has become legendary, single-handedly forced his company into a pre-eminent position in the personal computer world. Then he left the firm he'd founded, bought the then ailing Atari, and announced he'd soon be setting the computer world on its ear again with his own Mac-like computer — which would sell at a third of the price of the Apple machine. The computer press quickly dubbed the Atari 520ST the 'Jackintosh'.

The 520ST would be the first machine to provide GEM built-in, as part of the ROM, but what was all the excitement really about? Why was the prospect of pushing little images of computer files about more attractive than the idea of typing their names? And how did the 'mouse' — the small electronic device about the size of a pack of cigarettes, hooked by an umbilical cord to the parent computer, which the user rolls around the desk to simultaneously move a pointer on the computer screen — fit into all this?

You're sure to be well on the way to answering these questions for yourself if you've played with or own a Macintosh, or

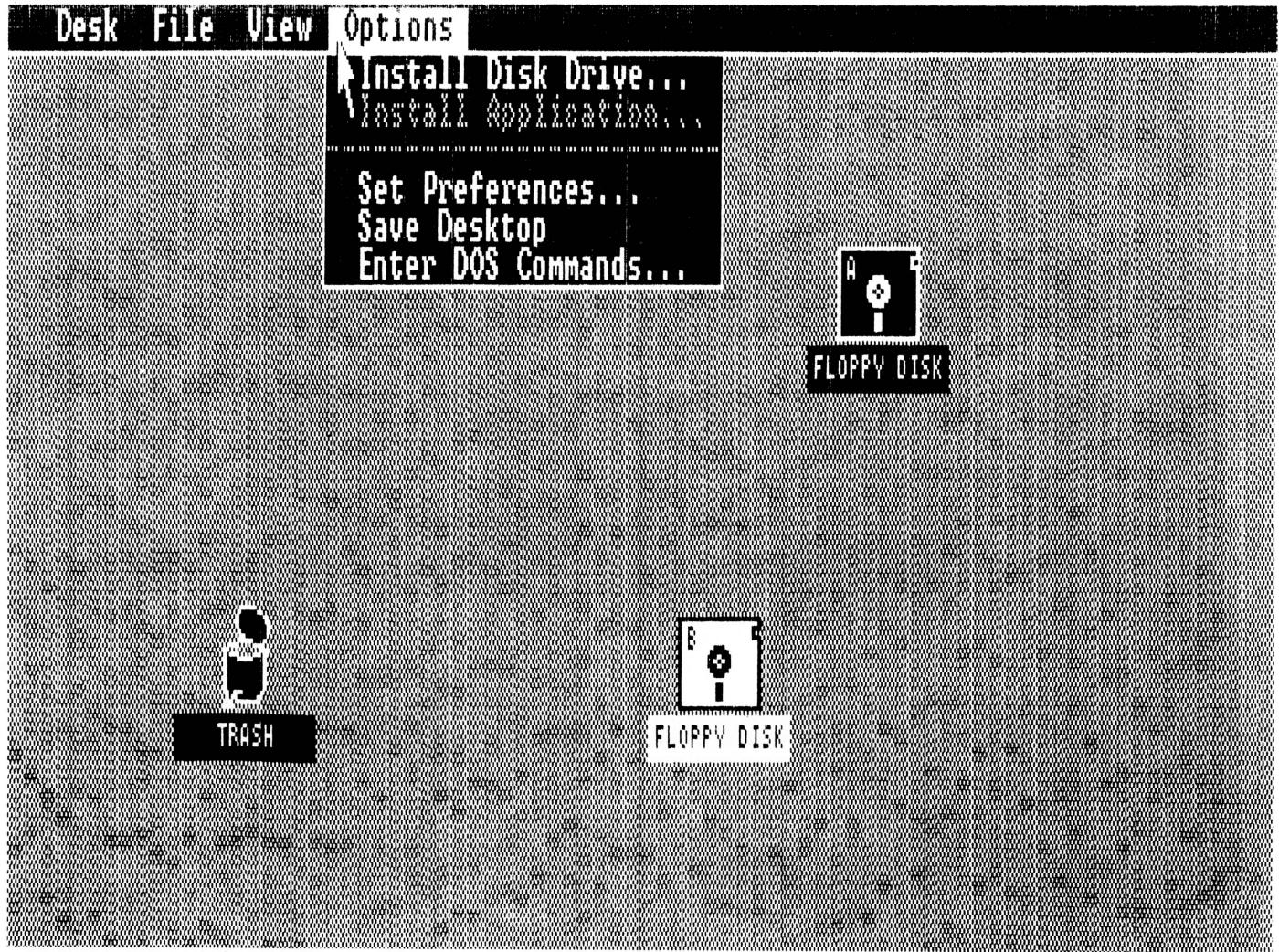


Figure 1.

if you've seen the 520ST in action. Although at times I suspect the whole manipulation of icons and the use of the mouse is a little beside the point and trivial, at other times I feel a powerful magic in seeing the actions of the mouse on the desk echoed on the screen, and — more relevant — having the computer know where the mouse pointer is on the screen, and reacting to that knowledge.

The raw details of the Macintosh story are pretty well known. Icons — the little pictures of hands, files, disk drives, clocks — are not new in computer terms. Originally developed by Xerox at its Palo Alto Research Centre as part of the work on the language Smalltalk in the Seventies, icons first saw widespread light of day on Apple's Lisa, the over-priced and ill-fated forerunner to the Macintosh.

The Empty Box

A computer is to some extent an empty box, if you ignore the physical electronic components. The real heart of the computer, the thing that 'fills up the box', is of course the software. From games through electronic spreadsheet calculators to word

processors, computers only become capable of action with software — and software needs humans to drive it: the 'user interface' is the face the software presents to the world.

Gary Kildall, whose company Digital Research developed GEM, is more or less responsible for many of the non-user-friendly user interfaces we've coped with over the past decade. Back in 1975, when working at Intel Corporation, Kildall developed CP/M (Control Program for Microcomputers). Before CP/M was developed, the majority of personal computers were operated by switches, and most output was in the form of flashing lights.

As you can imagine, this meant very few personal computers ever found themselves employed on any but the most trivial of tasks. Kildall developed CP/M to control disks, to accept input from a keyboard and to send output to a video monitor. With the ability to store programs on disk, and an emerging standard, it became worthwhile to write major software for microcomputers. CP/M became the standard by default; it was the only game in town. Kildall made computers running under

The 520ST would be the first machine to provide GEM built-in, as part of the ROM, but what was all the excitement really about? Why was the prospect of pushing little images of computer files about more attractive than the idea of typing their names?

Rise and Fall

CP/M (and the vast majority of 'non-iconic' computers still do exactly the same thing, or something pretty close to it) informed the operator they were ready to swing into action by printing something like this on the screen:

A>

The first sight of this prompt has sent a shiver of apprehension into the hearts of many who were tentatively stepping into the world of computers. "If that's how it begins," went the unspoken fear, "where does it end up? I could never cope."

Most of us learned to live with the old A>, and eventually found ourselves becoming quite fond of it, in a perverse self-punishing way.

Not all did so, of course. As we've seen over the past two years, a school of

thought has arisen which claims what the world needs now is icons, sweet icons. And so the tribe of Macintoshes began to sweep across the land. And those who had been locked out of the orchard began to scheme about ways to grow their own fruit.

If A> was to die, who better to help it on its way than the man who brought it to life?

KILL, KILL!

The Mac had proved that many people prefer telling a computer what to do by selecting a picture of the task rather than typing in somewhat obscure words or phrases. And for people such as myself, who could never remember whether to use DELETE, ERASE or the doom-laden

command KILL to get rid of an unwanted file from a disk, the idea of wiping out a file by 'dragging it into a trash can' was extremely attractive.

So Digital Research lied itself, for those of us who already had a computer, didn't want to buy a Mac but wanted to work that way, and created GEM.

There are several components to GEM. The major handling program is called GEM Desktop, which provides the main operating mechanism of the program. This allows you to show your disk contents as icons, and to do such things as call up the clock or calculator, delete or copy files, open and close windows, and manipulate menus.

You'll see (Figure 1) that my two disk drives are shown as icons, along with the

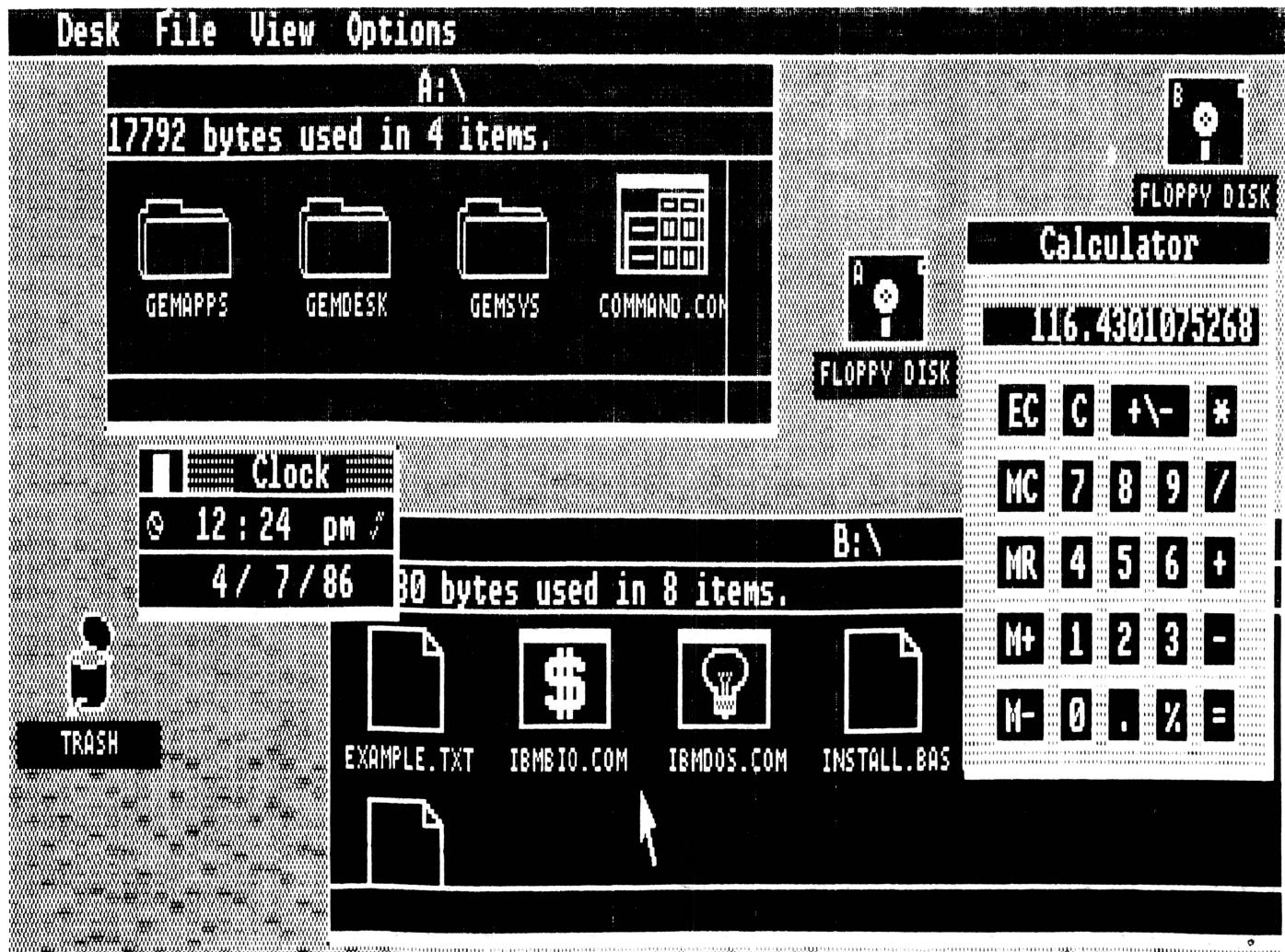


Figure 2.

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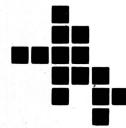
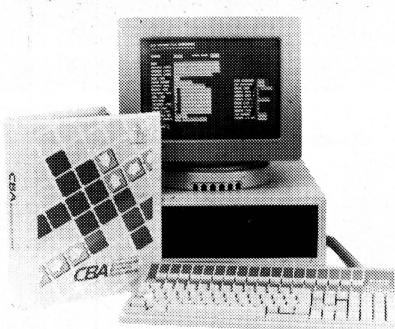
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Rise and Fall

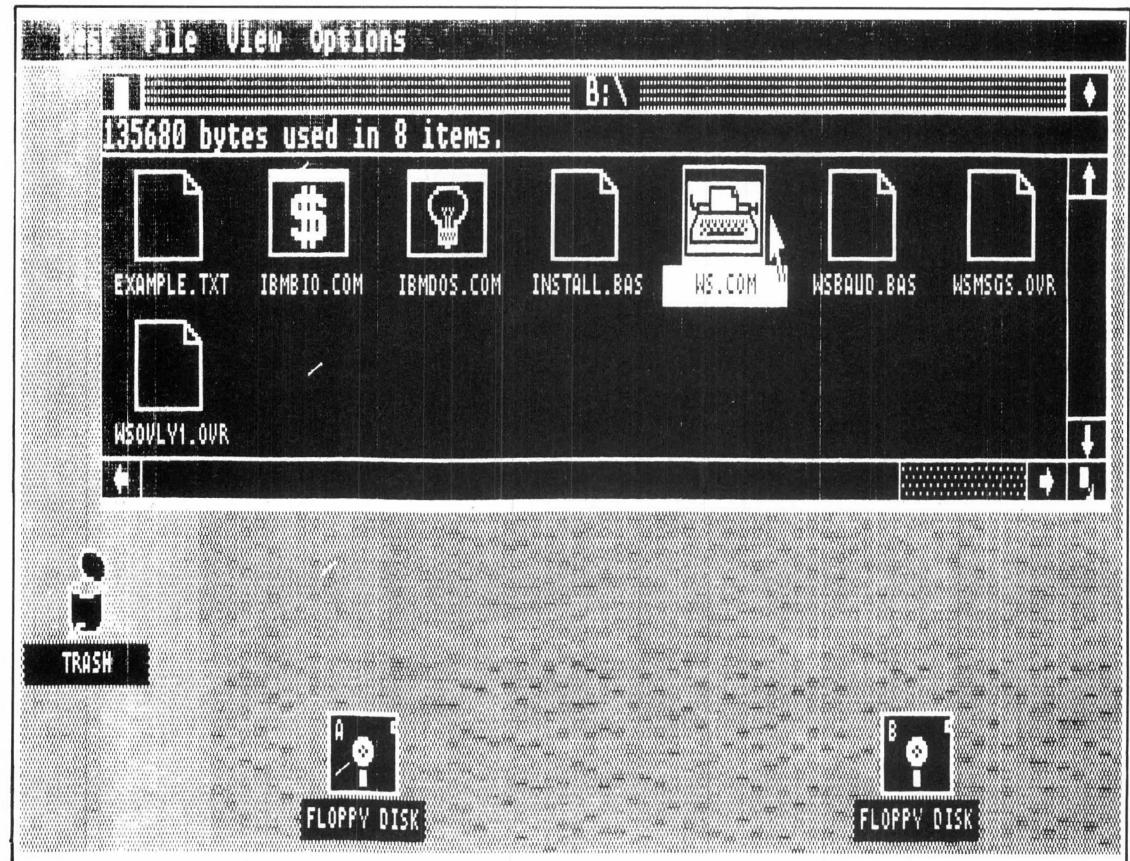


Figure 3.

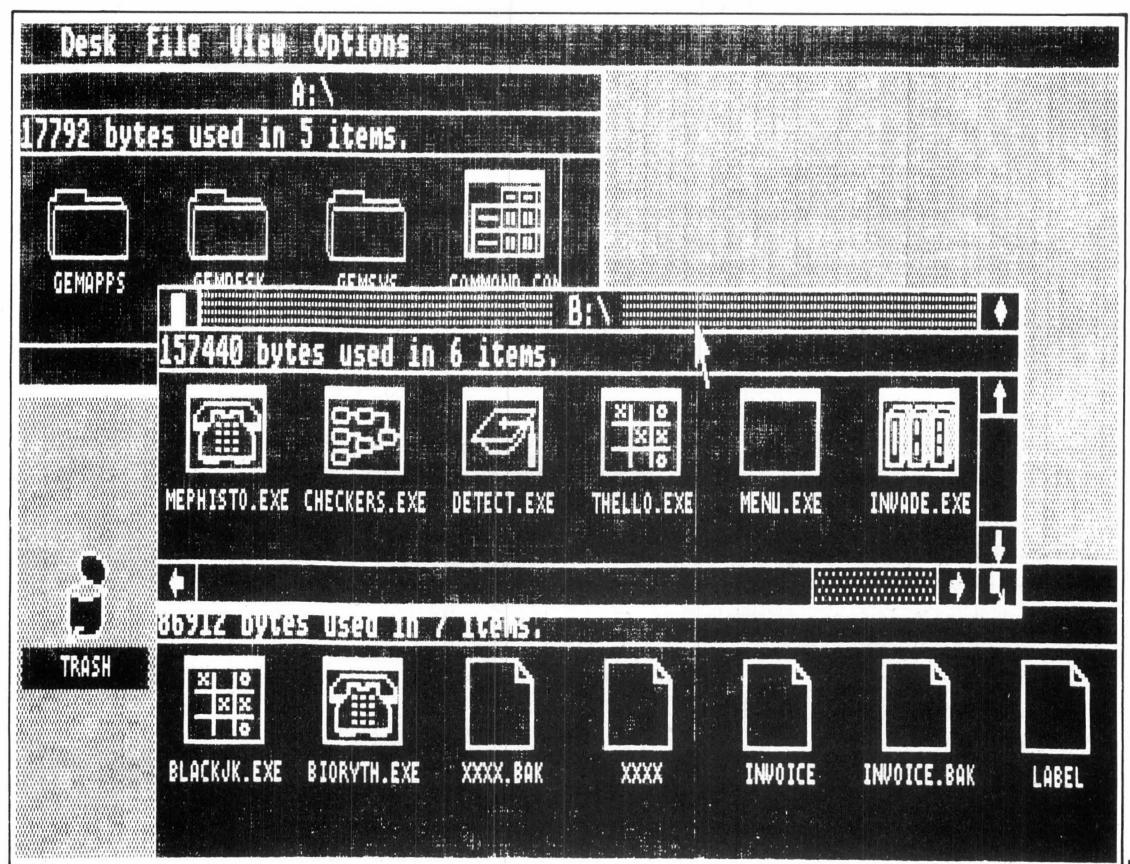
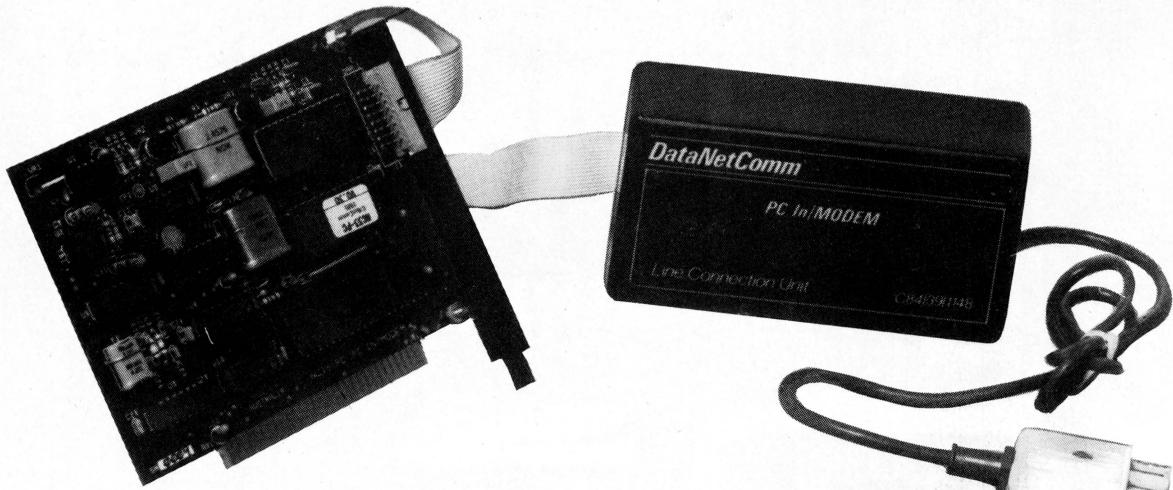
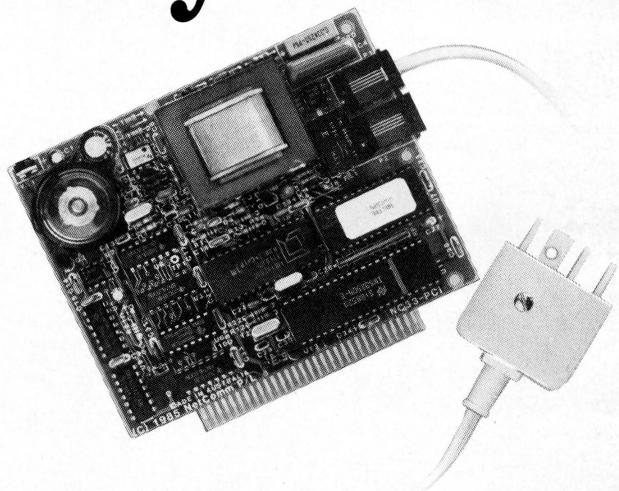


Figure 4.



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Retrace Time (H x V):	0.5Ms x 0.4msec
Resolution:	640 x 200 lines
Input Terminals:	9 pin "D" type connector
Dimensions:	11"(H) x 15"(W) x 13"(D) 266(H) x 367(W) x 318(D)mm
Shipping Weight:	15.9kg



Model HR31 200



Models HR 39 & HR 134

(All models Right-hand controls only.)

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Display Size (H x V):	203mm x 135mm
Display Time (H x V):	44Ms x 18.99msec
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Rise and Fall

'trash can' for disposing of unwanted items. As well, one of the 'drop-down menus' is shown. You can select items from that menu simply by placing the mouse pointer on the name of the item you want, then pressing the mouse button.

You can open a satisfyingly complicated multitude of windows on the screen, and have them overlapping in joyous confusion (as you can see in Figure 2), though only one window is 'active' at a time. You need to 'close' the window you're working on before you can open another.

Now GEM is just a visual 'front end'. Behind all the icons, the trash can, the flashing rectangles and multiple overlapping windows, good old A> still lurks. But you need never know. You can get all your old software running under GEM camouflage with practically no effort at all.

Just by using GEM Desktop, you can examine non-GEM disks and get them up and running. You can see (Figure 3) the result of having Wordstar in my drive B,

GEM in drive A, and opening a window for drive B. The 'iconic representation' of the contents of the disk is shown. To trigger Wordstar, all I would need to do is click on the mouse button.

You can see the arrow in the picture is pointing at the file called WS.COM, which is the filename I would normally enter from the A> prompt to get Wordstar running. Under GEM, I click on the button once to get the icon of WS.COM to change colour (showing it has been selected), then select the word Open from the drop-down menu (across the top of the screen) headed File.

Once I've done this, the GEM screen clears and Wordstar runs as normal. When I've finished with Wordstar, on exiting from the program I discover I'm back on the GEM desktop.

You can use GEM to 'tailor' the icons produced by your non-GEM disks, so they look as interesting as possible when invoked via GEM. For example (Figure 4), here is a games disk of mine, which has

been tailored for GEM operation. Any disk of programs — even ones you write yourself — can be tailored to be GEM-driven in this way. You need never confront A> again.

Gem Draw

A companion program to the Desktop is Draw, which produces a blank 'drawing board' on which you can vent your artistic skills. Even total non-artists (such as myself) can produce creditable results (see Figure 5) simply by drawing one object, then colouring, deforming and duplicating it electronically. This whole picture was created from a single 'flower'.

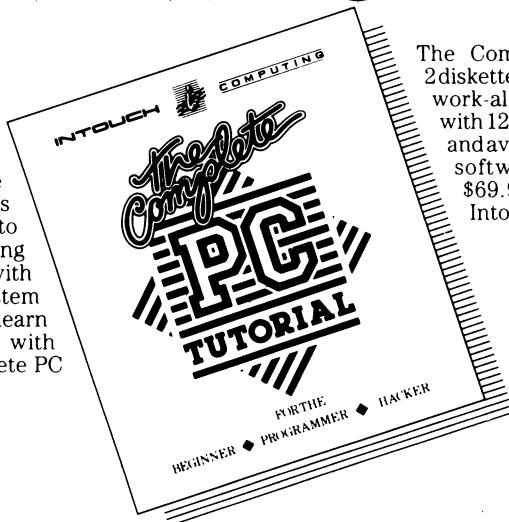
As you can see, Gem Draw looks even more like the Macintosh than the Macintosh. With GEM Paint (under development, but not available at the time of writing this article), all the artistic flexibility of the Mac promises to be available for the rest of us.

GEM has had a good start. As well as the colour version available with the Atari ▶

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LABTAM TACKLES THE GIANTS

On the edge of a vast paddock about 25 kilometres east of Melbourne a small high-tech company is tilting at windmills. The company is Labtam International and the windmills are giant multi-national companies. However, unlike Don Quixote, the impractical hero in Cervantes' romantic novel, this windmill tilting is neither extravagant nor idealistic: Labtam confidently intends to have a turnover of \$100 million by 1999, and a staff of 500.

The company has the figures on the board to prove it is going places. Four years ago it turned over \$2.3 million, and had less than 25 staff members. The '84-'85 fiscal period saw the figures increase to \$16 million, and the projected figure for the current fiscal period is \$25 million.

The company is riding high on the back of a computer that came about more or less by chance, according to John Sciffer, general manager, Computer Systems Division. Two of the current directors, Don Dryden and Heimo Eberhardt, started a scientific instrument company in 1972 with their redundancy cheques. In 1975 they attended an international conference at Monash University, Melbourne, where they were exposed to a new emission source technique known as Inductively Coupled Plasma. This technique, matched with suitable optical equipment, offered a new solution to elemental analysis. They decided to develop an ICP system using modern technology that could be marketed around the world, as well as in Australia.

David Tam and Trevor Knight joined the company and assisted in developing the first commercial scanning ICP system available in the world. This instrument is now known as the Plasmascan.

Because of the large amount of data now available to the operator from ICP, it became obvious that a new type of computer had to be developed to process this information, and development of the Labtam Series 3000 computers began in late 1980.

"They didn't realise what they really had," Sciffer explains, "until they heard all the comments from users as to its possible application in the commercial marketplace."

Labtam International began as a small company manufacturing scientific instruments. When these instruments proved to be so advanced they needed a special computer to analyse the data they produced, Labtam set about building one — and quickly found a commercial market for its top-quality products. Diane Lyttleton reports on the startling growth of one of Australia's top computer companies.

"They had tried to buy in a system which could do what they required, and when they couldn't they had to make one.

"When the first commercially oriented Labtam computer was sold, the move shifted the concentration for the company to 80 per cent of revenue being generated by the computer division and 20 per cent by the scientific instrument division."

Dryden and Eberhardt had started out in a little factory in Mordialloc, not far from their present site, where three Labtam complexes sit with other small factories on the edge of the paddocks. The Labtam complexes are for computers, scientific instruments and circuit boards.

The company has expanded so rapidly it now needs to move again. This time it requires three and a half hectares.

Attracting Investment

With the change of direction a regearing of the company's capital base became nec-

essary, and two years ago the Pratt Group Ltd took up a 35 per cent stake in Labtam with the option to transfer the holding to Australian Pacific Technology (APT), a management and investment company with which the Pratt Group was formally involved. Eight months later APT bought 14 per cent of Labtam, while the Pratt Group maintained its original 35 per cent interest.

"Labtam was APT's first investment," Sciffer says, "and now we're going public. We should be listed on the main board of the Melbourne Stock Exchange by April. This will provide capital for further expansion."

Labtam International is well known overseas as a manufacturer of quality computer hardware and scientific instruments, with most of its revenue derived from export sales. In January 1984 Labtam's exports, largely to the USSR and China, made up 90 per cent of its revenue.

This emphasis is changing fast, and the turnaround is the result of Labtam deciding to seek a higher profile in its own country and appointing a sales team of professionals who have all had at least 25 years in the computer industry.

"We are taking a young company and setting it in the right direction with these people. They are excellent people who understand marketing," Sciffer says. He recruited them, and has himself been in the industry for 36 years.

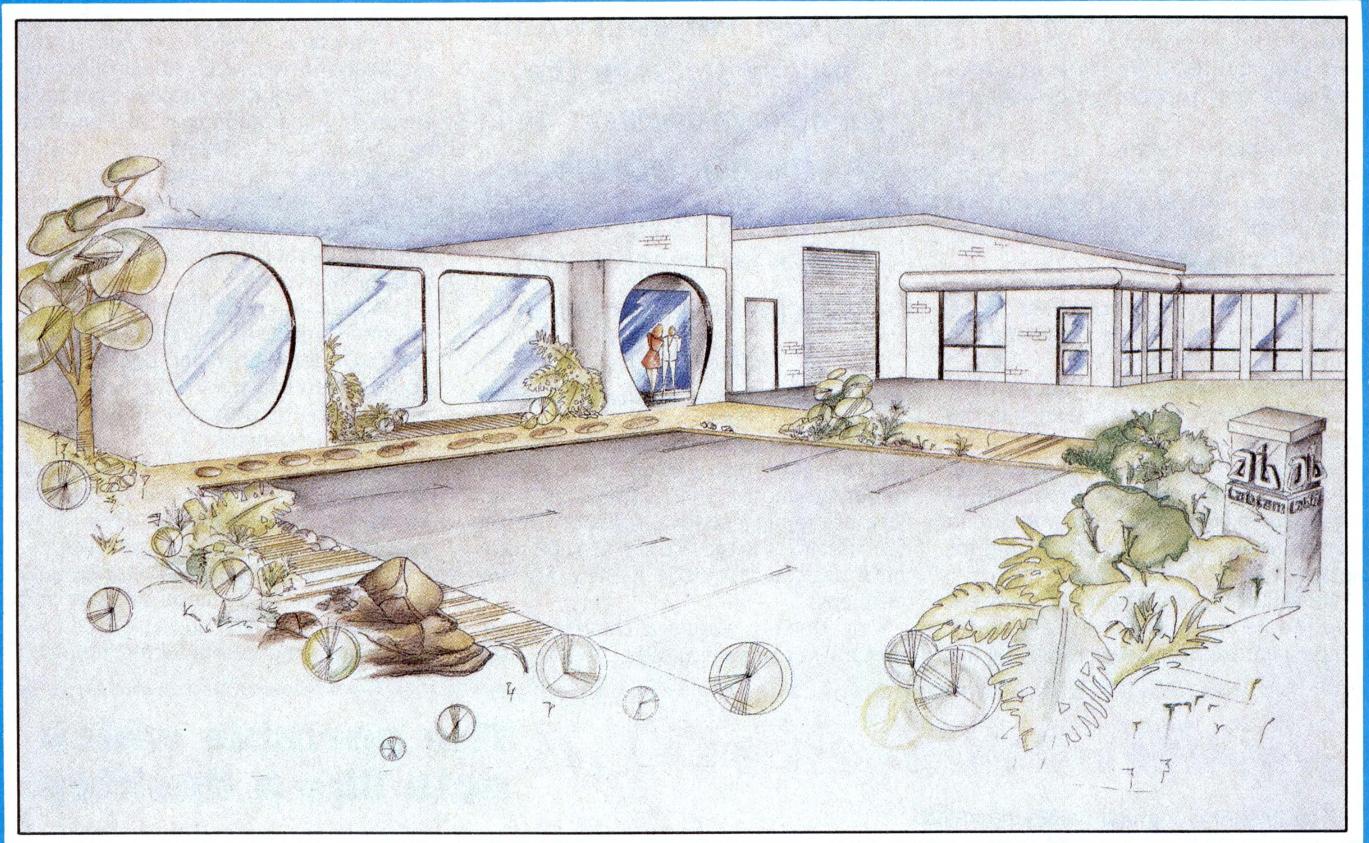
"We are a young Australian company up against the internationals, and a lot of these new people welcome the challenge, especially those who have worked for the big internationals."

World First

In May last year Labtam introduced the world's first Unix computer using the most advanced 32-bit silicon chip from National Semiconductor, the 32032 microprocessor. (The Unix operating system is becoming a world standard for supermicros and minicomputers.) According to Sciffer, Labtam's Unix 32-bit system's power is equivalent to the Vax 11/780.

"When we introduced it the industry didn't believe it was possible. The leaders in Australia shook their heads and said the machine couldn't exist because the

Giantkiller



chips weren't available commercially. We'd done something no other company in the world had done: we were the first in the world to receive engineering chips from National Semiconductor."

According to Sciffer, National Semiconductor approached Labtam and offered its research and development team the first engineering samples of the new chip because it thought the company had developed the technology to match the capabilities of the 32032 chip.

"They were actually staggered at how far we had gone on our own," Sciffer adds with satisfaction. "We received orders in Australia for 60 Unix boxes, gained a Federal Government contract to supply Unix machinery for three years to the Department of Aviation and won preferred supplier status to the University of Queensland."

"The Labtam is a quarter the size and a quarter the price of the Vax 11/780, yet it has the same crunching capacity — the same power — as has always been re-

garded as standard.

"We've had a bit of joy with this," Sciffer adds as an obvious understatement.

"It is a true 16-user system, whereas most Unix systems available will peter out after four or five are tacked onto them."

"This machine is the springboard for all our other development, and our research department will continue to enhance it."

Walking on the Chinese Wall

The Unix system, while proving extremely popular in Australia, will also enhance Labtam's activities in the Chinese market.

With the recent decision to stop all imports of 8/16-bit microcomputers to China, apparently the result of a recent buying drive in the microcomputer area that failed to find proper applications, China has been concentrating on 32-bit machines.

Labtam is said to use the only operating system able to run software written in both English and Chinese. Accordingly, Labtam hopes a joint project with the

Academy of Science in China will result in a manufacturing plant in China to develop the first Chinese-built mainframe computer for overseas commercial markets.

While China is ordering the 32-bit computer from Labtam, the USSR is largely interested in Labtam's 8/16-bit computer for laboratory work and for similar centres involved in data acquisition. Labtam has signed technology agreements with both the USSR and China, and has offices in Moscow and Hong Kong.

Heimo Eberhardt is the export manager of the company, while chairman Don Dryden is president of the Australian Computer Equipment Manufacturers' Association, which brings together Australian computer and telecommunications equipment manufacturers. The aim of ACEMA is to foster an indigenous computer industry.

Sciffer says Labtam is just starting to get credibility locally, despite the fact it is Australia's largest computer manufacturer.

"People see us as a competitor in the personal computer market, and we have never been into PCs. We are a vendor of multi-units that support more than one user."

"The people who started buying single units are now coming to us. We are really going places with a good research and development group and people who understand marketing."

"At the moment all our systems are hand-built. A major result of a float on the Stock Exchange will be the automation of our manufacturing facility."

This move will place the company in a good position to consider a launch in the United States market.

The company's new chief executive, Roger Levy, firmly believes it is possible to manufacturer cost-effectively in Australia and says there will be no off-shoring for Labtam.

"We will be developing more hardware and software and, with growth, aiming for a 50 per cent export market. Satisfying the

"Labtam has achieved its unique status in the scientific instrument and information technology markets by being a world leader in research and development for both industries."

needs of our customers is our first priority and we have restructured the company under the motto 'The Customer is King'. One of the biggest advantages of Labtam for customers is that we can provide technical assistance quickly if there are any problems."

Don Dryden, writing a chairman's address in a company profile, stated, "Lab-

tam is endeavouring to double turnover each year and invest 30 per cent of total overheads in research and development. We believe our future success can only be ensured by maintaining a high emphasis on research and development. Labtam has achieved its unique status in the scientific instrument and information technology markets by being a world leader in research and development for both industries."

It is all a far cry from when Dryden, the salesman, and Eberhardt, the service engineer, were retrenched and began building up a little company with the help of their families. Eberhardt is now 39 and Dryden is nearing retirement.

Labtam won an Australian Export Award in 1982 and a Small Business Award the same year; in 1985 it was awarded an Australian Design Award.

The young company that started out in a quite different direction appears to be branching out very successfully in the high-tech area of computer technology. □

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Instruction Set

C For Smarties — Part 6 77

Les sez the C can be rather obscure at times, so to be on the safe side he's clad himself in his Jacques Cousteau rubber suit for the duration of this lesson. For entertainment he'll sing some old C expressions (or dittos), and as he sinks further beneath the C-level, where temperatures are known to be non-zero, his voice will rise to a falsetto in *b* minus *a*. (Obscure probably isn't the word.)

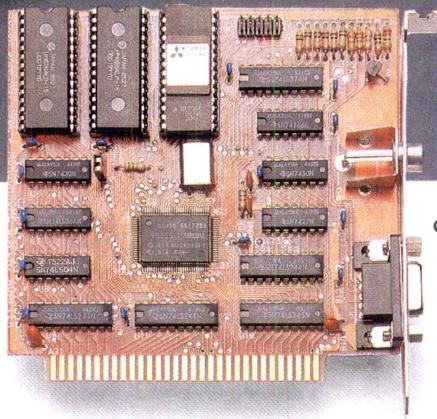
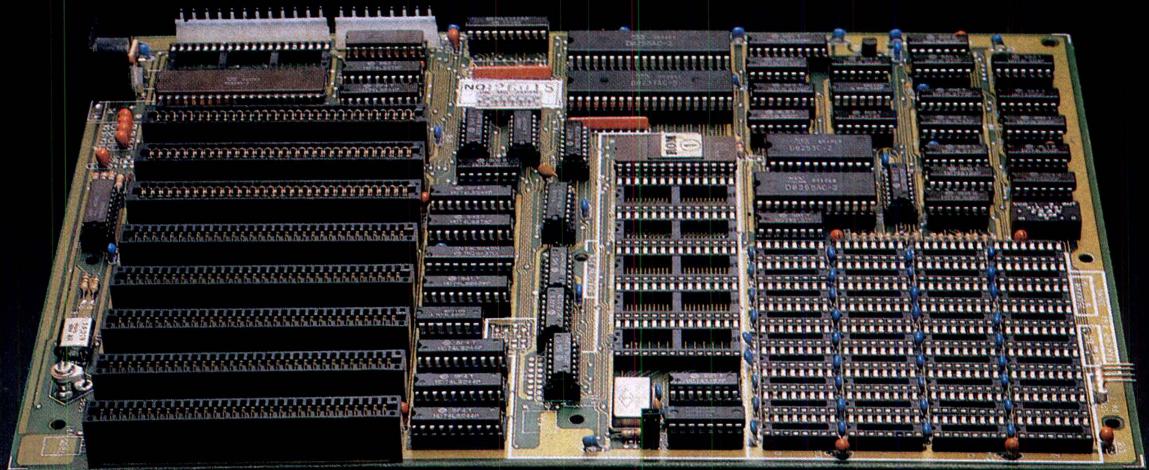
Feeling Outa Sorts 80

Tim Hartnell is feeling even less buoyant than the Bell, after sorting out the bubbles from the shells, and swapping the insertions for the sort by count — which turns out to be by far the most efficient sort anyway.

Computing for Birdwatchers 93

"Here's a character . . . I got that character, so send me another." A greedy sort? A case of misplaced identities? No, it's all part of Les's latest lecture on the mysteries of computing—the ins and outs of them. You know, the I/O mechanisms, the bits that let you enter things in the computer, and let the computer regurgitate them? . . . perhaps you should read the article.

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C FOR SMARTIES

This month, Les Bell indulges his fascination with C-levels. The lesson centres around C creatures at the operator tide line, including unary octopi, the odd binary cupid and the ternery, a rare C-gull.

THE C PROGRAMMING language is unusual in being both low-level and high-level at the same time. In this month's article we explore some low-level operators and some high-level control structures.

The , Operator

You'll recall that the for loop in C is considerably more powerful than that in BASIC and other languages. Rather than being a loop statement in its own right, it is a modification and restructuring of the while loop. As such, it is not restricted to the simple task of loop counting — it can also carry initialisation, test and reinitialisation expressions.

So, to calculate a factorial, for example, we can write the following short program:

```
/* fact.c */
main()
{
    long i,j,fact;
    fact = 5;
    for (i=1,j=1;i<=fact;i++,j*=i);
    printf("\nFactorial %ld = %ld",i,j);
}
```

Here, we are using the for loop in a more powerful way (slightly). There are still three components to the for statement, but two of them have sub-components. The initialisation statement consists of the expression:

```
i=1,j=1;
```

The comma operator has higher precedence than the semi-colon, and associates from left to right. In other words, the expression sets i equal to 1 and then sets j equal to 1. Of course, I could have written:

```
i = j = 1;
```

but that wouldn't have used the comma operator, which is what I wanted to explain!

The loop comparison test is very straightforward — nothing interesting ►



C PROGRAMMING

here. However, the reinitialisation also has two statements, to both increment i and multiply the value of j. Notice also that the body of the loop is empty; all the work is done in the for statement itself.

The statement which multiplies the value of j is also an interesting use of C's shorthand:

```
j *= 1;
```

This expands into $j = j * 1$. Whenever you want to perform some operation on a variable, such as adding some value to it, right-shifting it, multiplying its current value by something and storing the result again, you can use a shorthand version of the expression. Some examples are shown in Table 1.

Of course, that expression in the for statement could have been written:

```
j *= ++i;
```

which would have had the same effect, though it would be less readable. C can get pretty obscure at times, so I often prefer to use less compact, but more easily understood equivalents.

The Ternary Which

Computer scientists classify operators as unary, binary or ternary. A unary operator is one which acts on a single value or variable, such as unary minus; -1 is the unary minus operator applied to 1. Other unary operators include the pre- and post-increment and decrement operators we saw last month.

Binary operators are those which operate on two values or variables to produce a result. The best-known examples are $+$, $-$, $*$ and $/$. These operators combine two values.

Ternary operators, which are considerably more unusual, combine three values. C has only one ternary operator, but that's one more than most computer languages.

The ternary which operator, $?$, is used to return one of two values depending on the

logical value of some third expression. Its syntax is as follows:

```
logical-expression ? true-expression : false-expression
```

Logical-expression is a C expression which evaluates to either true or false (that is, 1 or 0). Depending on its value, either true-expression (which need not, despite the name, have a value of true) or false-expression (ditto) is returned as the value of the expression. The latter two expressions should be of the same, scalar, type. Let's see some examples:

```
a > b ? a : b
```

If a is greater than b, the value of the expression is a; if the expression $a > b$ is false, however, the value of the expression is b.

```
i ? i + '0' : ''
```

Here, if i is non-zero, that is, true, the expression evaluates to the character equivalent to i; while if i is false, that is, zero, the expression evaluates to a space (i is assumed to be in the range 0 to 9).

The ternary which is extremely useful as a kind of modified if command which, rather than selecting one branch of execution, selects one of two values for insertion into an expression or statement. The closest equivalent in other languages is the IIF (immediate if) statement in dBase III Plus.

Logical AND and OR

The logical AND ($\&\&$) operator is a binary operator which takes two values and ANDs them to produce a result. The AND function is given by the truth table — see Table 2.

The first two columns in the table represent the possible values of the variables X and Y, each of which can take the value true or false. In the C language, false is represented by the value zero, while true is any non-zero value (an important point to remember, since it is used in many C

Expression	Meaning
c += 2;	c = c + 2;
j *= i;	j = j * i;
span /= 2;	span = span / 2;
status >>= 2;	status = status >> 2;
status &= MASK;	status = status & MASK;

Table 1.

X	Y	X&&Y
F	F	F
F	T	F
T	F	F
T	T	T

Table 2.

functions). If the compiler has to generate a value of true, it will generate a one. The third column is the result of the operation $X \&\& Y$.

The essential thing to remember is that $X \&\& Y$ is true if and only if X is true and Y is true.

The logical "OR" function (written as $\|$, two vertical bars) can be similarly expressed through a truth table — see Table 3.

X	Y	X \| Y
F	F	F
F	T	T
T	F	T
T	T	T

Table 3.

In this case, the essential point is that $X \| Y$ is true if either X is true or Y is true (or both).

The third logical operator is the ! (NOT) operator. This negates a logical value or expression, turning a zero (false) into a one (true) and any non-zero value (true) into a zero (false). It is a unary operator, and has higher precedence than and and or (sorry about that), so it takes effect before those operations.

Bearing all that in mind, then, what does the following program print?

```
main()
{
    int x,y,z;
    x = -1;
    y = 0;
    z = 1;
    printf("\n x && y = %d", x && y);
    printf("\n x || y = %d", x || y);
    printf("\n !x || y = %d", !x || y);
    printf("\n x && z = %d", x && z);
}
```

The answers are at the end of the article.

Bitwise Operators

Related to the logical operators, but used for different purposes, are the bitwise operators. These are higher in precedence than the logical and and or operators, so will be executed first in an expression.

There are three binary bitwise operators: $\&$ (bitwise and), $^$ (bitwise exclusive or), and $|$ (bitwise or), ranked in order of precedence. Their truth tables are shown in Table 4.

In these tables, true and false have been replaced by one and zero, since we are dealing with the values of individual bits

C PROGRAMMING

in an integer type (char, int or long). When two variables are operated upon bitwise, the result is generated bit by bit along the length of the variables.

Let's look at an example:

Decimal	Binary
1	01
& 2	10
---	---
0	00

Or, for the bitwise or operator:

Decimal	Binary
1	01
| 2	10
---	---
3	11

The operator is applied to pairs of corresponding bits in both values.

Bitwise and and or, as you can see from the truth tables, are analogous to their logical counterparts. The only 'new' operator is the exclusive or operator, which produces a result of one when the two input

values are different and zero when they are the same. In other words, exclusive or of X and Y is true when either X is true or Y is true, but not both.

There is a unary bitwise operator, \sim , called one's complement. This is a bitwise not operator, which simply inverts all the bits in its argument. Here's an example:

-1	decimal
= ~00000001	binary
= 11111110	binary
= -2	decimal (two's complement arithmetic)

A Bit Of A Shift

C also provides the ability to shift all the bits in a variable to the right or left a specified number of places, which is useful in writing specialised binary arithmetic functions (shifting n bits to the left is equivalent to multiplying by 2 to the power n) and for calculating polynomials for error detection on files and communications programs.

The two operators provided are $>>$

(right shift) and $<<$ (left shift), and they are binary operators. Some examples:

Decimal	Binary
1 << 3	= 8
00000001 << 3	= 00001000
Decimal	Binary
3 << 4	= 48
00000011 << 4	= 00110000
Decimal	Binary
48 >> 5	= 1
00110000 << 5	= 00000001
Decimal	Binary

At the top of the precedence table, of course, are the parentheses, which are used to modify the order of evaluation of expressions which would otherwise be wrong. Parentheses can be used on any type of expression — logical, binary arithmetic, floating point, character, and so on.

The other operators relate to topics we have not yet addressed, and we will deal with them later. However, the first two we should look at are $\&$ (address of) and $*$ (pointer indirection) — we'll save them for the next instalment. □

X	Y	X&Y
0	0	0
0	1	0
1	0	0
1	1	1

X	Y	X^Y
0	0	0
0	1	1
1	0	1
1	1	0

X	Y	X Y
0	0	0
0	1	1
1	0	1
1	1	1

Table 4.

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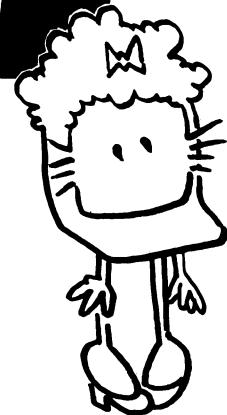
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FEELING out of SORTS



Most of the computer programs in regular use around the world are applications or business programs, and the majority of them use sorts in some form or another. In fact, according to Jonathan Amsterdam, writing in *Byte* magazine (September, 1985, p. 105), 90 per cent of all computer programs do some kind of sorting.

The most basic sorting needs are for a series of strings to be placed in alphabetical order, or for numbers to be placed in an ascending or descending series. Whether it is names of products in a store-room, a mailing list to be ordered by post-codes, or a ranking of examination results from highest to lowest within a class, similar sorting techniques can be used.

However, there is a bewildering number of sorting algorithms, and they differ wildly in their efficiency. We'll be looking at five different sorting techniques in this article, in which the most efficient one works 30 times faster than the least efficient. You'll probably find it quite interesting to run the different sorts on your own computer, and time them as they sort out your own lists. The difference in speed —

You may be surprised to learn 90 per cent of all programs run some kind of sort process — but now you know, it'll be easy to appreciate that the kind of sort you use is going to make a big difference either to the time it takes to run your program, or the memory overheads required — or, in the worst case, both. Tim Hartnell examines five different sort algorithms, and ranks them for speed and efficiency.

which will, of course, be most noticeable with a long list — is quite amazing.

Although it makes little practical difference which sort you use when the list to be sorted is short, it becomes increasingly

important as the length of the list grows. And if you're writing a business applications program which either sorts a long list from time to time, or sorts short lists frequently, it is very important to choose the most efficient sort.

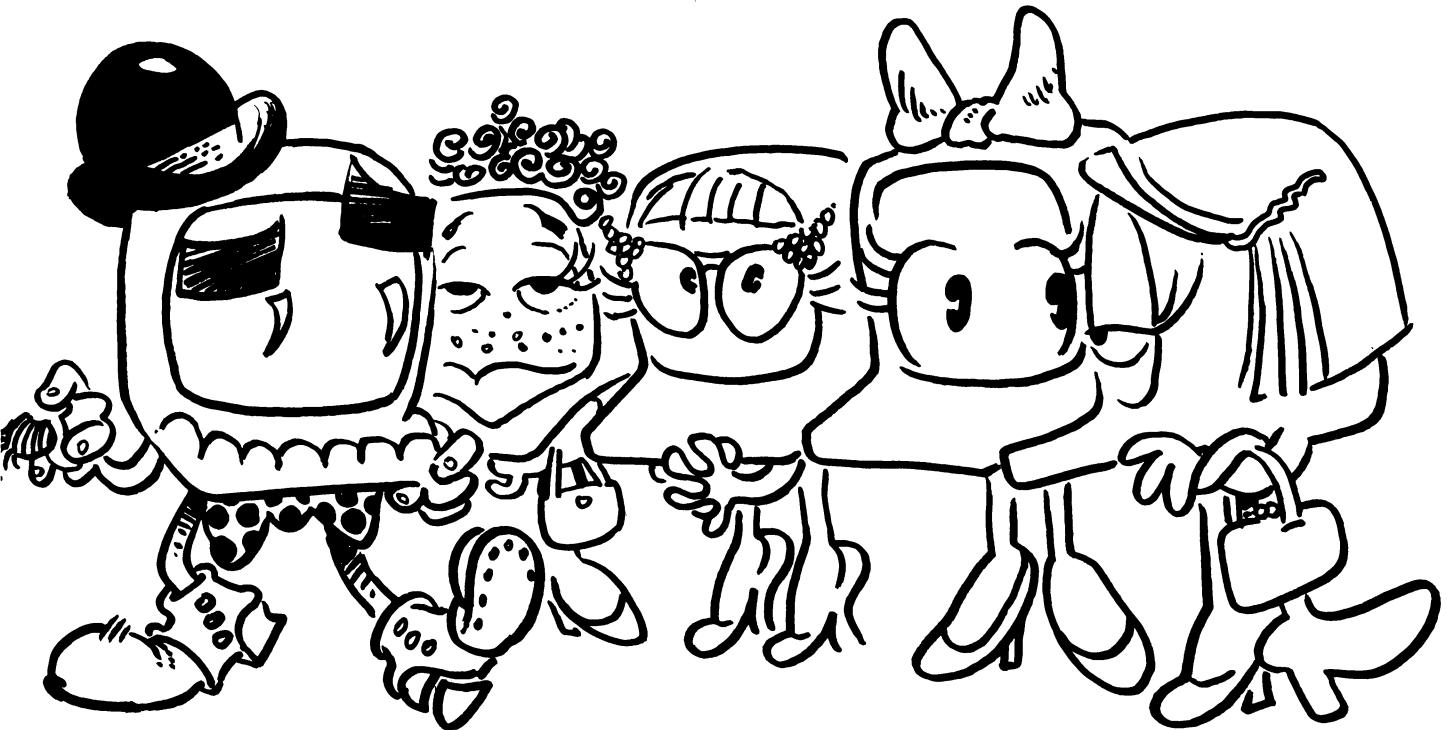
You'll find the programs in this article should work with little or no modification on any computer which uses BASIC. I've deliberately stuck to a common subset of BASIC to make it easy to run the programs on any machine.

Speed and Storage

Tony Guttmann, a lecturer at the University of Newcastle, NSW, in his book *Programming and Algorithms* (Heinemann, 1977; p. 146), points out that choosing the correct sort for a job often involves a compromise between various incompatible requirements. "The two most commonly conflicting requirements," he writes, "are storage space and executive time." Some sorts, as we shall see, demand no additional memory to that which holds the original unsorted data. In the worst case, a second array equal in size to the one holding the original data is needed to hold elements during a sort. The other sorts lie between these two extremes.

In each of the programs in this article, the list to be sorted is an array filled with random numbers, which are then sorted into ascending order. The number of elements in the list can easily be altered, to demonstrate clearly that the efficiency of some sorts declines quite dramatically as the length of the list to be sorted increases.

OUT OF SORTS



Bubble Sort

We'll start with the Bubble Sort (program A). In this, the computer looks at the first two elements in the list — $A(K)$ and $A(K+1)$ — and swaps them over if necessary. Next, the program looks at elements two and three in the list, and interchanges them if required. Once it has reached the end of the list on the first pass, the bubble sort program goes back and does it over and over again, until the list is in order. The time a bubble sort takes to order a list is proportional to the square of the number of elements to be sorted.

You can use your computer's internal clock to see how long it takes the program to sort a particular list into order. On the IBM PC, on which these programs were developed, the string variable TIMES\$

```
10 REM Bubble Sort
20 CLS:INPUT "How many items to be sorted":N:
CLS
30 DIM A(N)
40 FOR Q=1 TO N:A(Q)=INT(RND(1)*N+1):NEXT Q
50 PRINT "Sort starting now..."
60 K=1
70 X=A(K):Y=A(K+1)
80 IF X>Y THEN 140
90 A(K)=Y:A(K+1)=X:TEMP=K-1
100 IF TEMP=0 THEN 140
110 X=A(TEMP):Y=A(TEMP+1):IF X<Y THEN 130
120 A(TEMP)=Y:A(TEMP+1)=X
130 TEMP=TEMP-1:GOTO 100
140 K=K+1:IF K<N THEN 70
150 PRINT "Sort finished:"
160 FOR J=1 TO N:PRINT A(J);:NEXT J
```

Program A. The Bubble Sort.

holds the current time. By adding the following two lines, the program will time the sort by itself:

```
55 TIME$="00:00:00"
145 PRINT TIMES$
```

When I added these lines, and tried the program with different length lists, it produced these results:

Elements	Seconds
20	3
50	24
100	98
150	224

It would be interesting to see how well your computer performs in comparison with mine, but you can see how the time the sort takes rises quite unacceptably. If you had a list of 10,000 numbers to sort, you could practically paint the Harbour Bridge before the sort was finished.

```
10 REM Swap Sort
20 CLS:INPUT "How many items to be sorted":N:
CLS
30 DIM A(N)
40 FOR M=1 TO N:A(M)=INT(RND(1)*N+1):NEXT M
50 PRINT "Sort starting now..."
60 FOR B=1 TO N-1
70 FOR C=B+1 TO N
80 IF A(B)<A(C) THEN 100
90 TEMP=A(B):A(B)=A(C):A(C)=TEMP
100 NEXT C:NEXT B
110 CLS:PRINT "Sort finished:"
120 FOR J=1 TO N:PRINT A(J);:NEXT J
```

Program B. The Swap Sort.

With the Shell Sort we're moving into the Brands Hatch area of sorts, where things really start zipping along. Although it needs a little extra storage, it is very fast.

Swap Sort

The Bubble Sort, even though it was slow, did not demand additional memory to hold the elements of the list as they were sorted. Similarly, the Swap Sort doesn't need extra memory. A Swap Sort is given as program B, so you can try it out. Starting with the first two elements in the list, this sort interchanges them if necessary. If they do not need to be swapped over, the program looks at the next two. If the first two do need to be swapped, the swap is made, and then the program goes back to the beginning. This occurs until it gets to the end of the list.

To time the program, I put my additional timing lines in as 55 and 115. I got these results:

Elements	Seconds
50	12
100	49
150	115

Whereas it took the Bubble Sort 24 seconds to put a list of 50 items in order, the Swap Sort took just 12 seconds. When the length of the list to be ordered was increased by a factor of three (to 150), the Bubble Sort time increased by 93 per cent, while the Swap Sort time increased by around 96 per cent. This suggests that while the time it takes the sorts to work increases as the length of the list increases, the Swap Sort may degrade to a greater extent. Try both programs with lists of 1000, and then more, numbers, and see if you can work out at which point — if any —

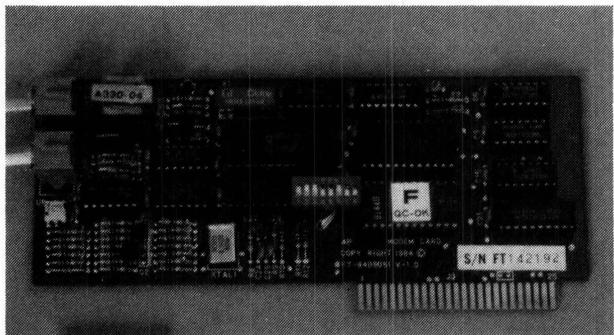


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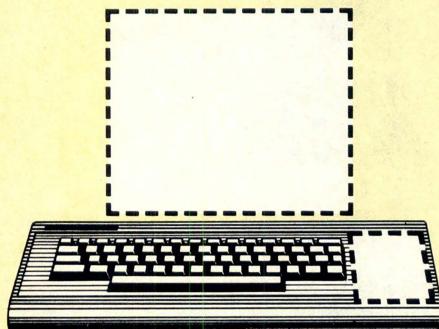
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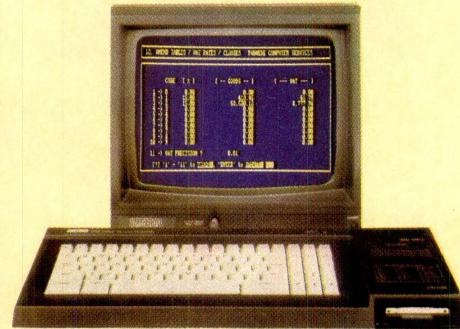
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Instead of finding the time taken increases as the square or cube of the number of elements in the list, the Sort by Count time increases only arithmetically with the number of elements — so the time taken to sort a list of 100 elements should be exactly double the time it takes to sort 50 elements.

```
10 REM Insertion Sort
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N)
40 FOR Q=1 TO N:A(Q)=INT(RND(1)*N+1):NEXT Q
50 PRINT "Sort starting now..."
60 FOR K=2 TO N
70 J=K-1:L=A(K)
80 IF L>A(J) THEN 110
90 A(J+1)=A(J)
100 J=J-1:IF J>0 THEN 80
110 A(J+1)=L:NEXT K
120 PRINT "Sort finished:"
130 FOR J=1 TO N:PRINT A(J),:NEXT J
```

Program C. The Insertion Sort.

— a Bubble Sort would become more efficient than a Swap Sort.

Insertion Sort

Like the first two sorts we've looked at, the Insertion Sort (program C) does not demand additional memory. Whereas the time taken to sort a list with the Swap Sort is related to the number of elements in the list cubed, the time the Insertion Sort takes to order a list is related to the number of items squared.

Here it is in action:

Elements	Seconds
20	1
50	8
100	34
150	85

As the number of elements doubles (from 50 to 100), the time taken increases, in this example, by a factor of 4.25, which is more or less as expected. Tripling the number of elements, to 150, increases the

time taken by a factor of 10.6, which again is related to the square of the number of elements in the list. Of course, I'm using pretty rough-and-ready timing methods (with, by the way, my timing lines inserted as 55 and 115), and when you run the program with larger lists, and perhaps using a stop watch, you may find the time taken in various cases is closer to that which is predicted.

Shell Sort

Now we're moving into the Brands Hatch area of sorts, where things really start zipping along. The Shell Sort (program D), although it needs a little extra storage (in this case, an array containing 10 elements), is very fast.

According to D. E. Knuth, in his book *The Art of Computer Programming* (Addison-Wesley, 1973), it works by filling the elements of the S array with a set of increasing integers starting with S(1)=1. "The best set is not known," he writes, "but the sequence 'S(j+1) = S(j)*3+1' is good." Once this is done, the program finds the smallest value P, such that S(P+2)>=N (where N is an element in the list to be sorted). Then, for each S=S(K), where K is a loop control variable in a FOR/NEXT loop going down from P to 1 (see the end of line 100 in our program), take each value of J from S+1 to N, and insert A(J) in its proper position.

Complex as the 'explanation' may seem, you don't need to be able to make sense of it in order to use the Shell Sort. When I ran it with two small sample lists of randomly generated numbers I got these results:

Elements	Seconds
100	11
1000	208

```
10 REM Shell Sort
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N),S(10)
40 FOR M=1 TO N:A(M)=INT(RND(1)*N+1):NEXT M
50 PRINT "Sort is beginning now..."
60 S(1)=1:FOR J=1 TO 9:S(J+1)=S(J)*3+1:NEXT J

70 P=0
80 P=P+1
90 IF S(P+2)<N THEN 80
100 FOR K=P TO 1 STEP -1:S=S(K)
110 FOR J=S+1 TO N:L=J-S:A=A(J)
120 IF A>A(L) THEN 140
130 A(L+S)=A(L):L=L-S:IF L>0 THEN 120
140 A(L+S)=A(L):NEXT J
150 IF K>1 THEN FOR Q=1 TO N:PRINT A(Q),:NEXT Q
160 PRINT:PRINT:NEXT K
170 PRINT "Final sorted list:";PRINT
180 FOR J=1 TO N:PRINT A(J),:NEXT J
```

Program D. The Shell Sort.



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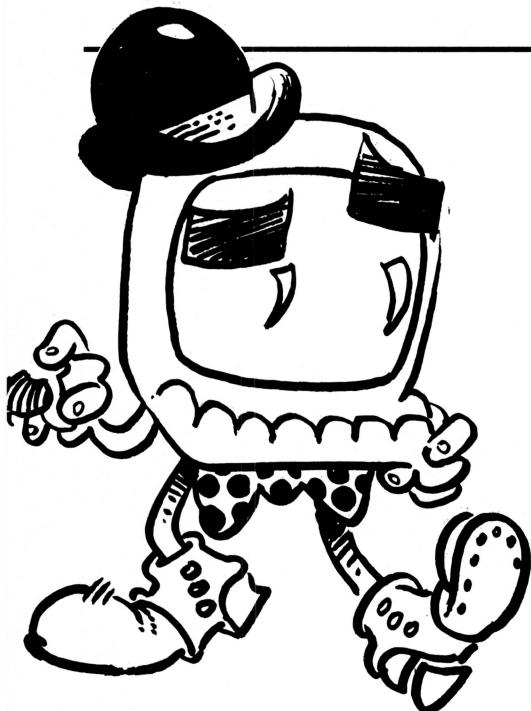
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This is almost ten times faster than the Bubble Sort for 100 elements, five times faster than the Swap, and three times faster than the Insertion Sort. Clearly, the small overhead cost of an additional array of 10 elements is worth paying. (To time the Shell Sort, I placed my TIMES lines at 55 and 165.)

Sort by Count

The final sort we will examine in this article, and the one which puts all the others to shame in terms of speed of execution, is the Sort by Count, which needs an array in addition to the one which holds the original data. The second array (C in our program, program E) contains the same number of elements as the value of the largest element in the data (so if the numbers in the original data were 6, 84 and 17, C would need 84 elements).

```
10 REM Sort by Count
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N),Q(N)
40 INPUT "Highest value in data";M:CLS
50 DIM C(M)
60 FOR Q=1 TO N:A(Q)=INT(RND(1)*M+1):NEXT Q
70 PRINT "Sort starting now..."
80 FOR J=1 TO M:C(J)=0:NEXT J
90 FOR J=1 TO N:C(A(J))=C(A(J))+1:NEXT J
100 FOR J=2 TO M:C(J)=C(J)+C(J-1):NEXT J
110 FOR K=N TO 1 STEP-1
120 TEMP=A(K)
130 J=C(TEMP):Q(J)=TEMP:C(TEMP)=J-1
140 NEXT K
150 CLS:PRINT "Sort finished now:"
160 FOR J=1 TO N:PRINT Q(J),:NEXT J
```

Program E. The Sort by Count.

The cost of this storage overhead is well worth paying, as the time to sort a list of N elements is directly related to N. Instead of finding the time taken increases as the square or cube of the number of elements in the list, the Sort by Count time increases only arithmetically with the number of elements (so the time taken to sort a list of 100 elements should be exactly double the time it takes to sort 50 elements).

The program works by setting every element of the C array to zero (line 80). Then, for each element of array A, the program increments its corresponding counter C(A(J)). This means C(J) is now set to the number of elements in the original list of data, equal to J. Next, the program counts from 2 up to M (where M is the value of the largest number in the original list), adding to each C(J) the number of elements less than or equal to J.

Finally, using a loop counting backwards from N (the number of items in our original list) to 1 (see line 110), each ele-►

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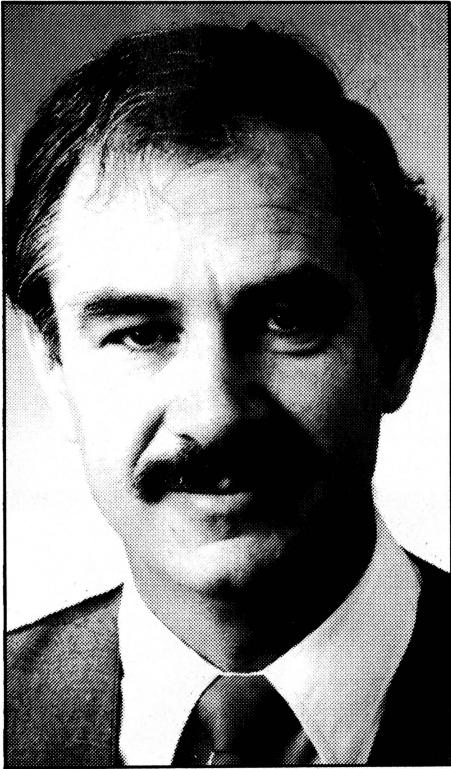
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ment A(K) is copied (holding the value temporarily in the variable TEMP) to Q(C(A(K))), and C(A(K)) is decremented.

At the end of all these shenanigans, we have a sorted list.

Now, because the time the program takes to carry out a sort is dependent, to some extent, on the value of the largest number in the list, I ran a few additional tests on this program. The other sorts were tested, at one stage or another, by sorting 100 numbers chosen at random in the range 1 to 100, so it was important to do the same test for Sort by Count so they could be compared. I also ran tests with a

If you're writing a business applications program which either sorts a long list from time to time, or sorts short lists frequently, it is very important to choose the most efficient sort.

Range of numbers	No. of elements	Time to sort
1 — 10	100	3 seconds
1 — 100	100	4 seconds
1 — 500	100	9 seconds
1 — 10	1000	24 seconds
1 — 1000	1000	37 seconds

Table 1. Results of the Sort by Count speed tests.

smaller range, to see the effect this had on the speed of the sort. My results are shown in Table 1.

You can see the Sort by Count is a regular tearaway compared with the other sorts we've examined in this article. We can directly compare the sort of 100 numbers, in the range 1 to 100, with the other sorts, as they were all carrying out the same task (insert the TIMES\$ lines in Sort by Count at lines 75 and 155). Here's how they measure up:

Bubble Sort: 98 seconds — 100 per cent

Swap Sort: 49 seconds — 50 per cent

Insertion Sort: 34 seconds — 35 per cent

Shell Sort: 11 seconds — 11 per cent

Sort by Count: 4 seconds — 4 per cent

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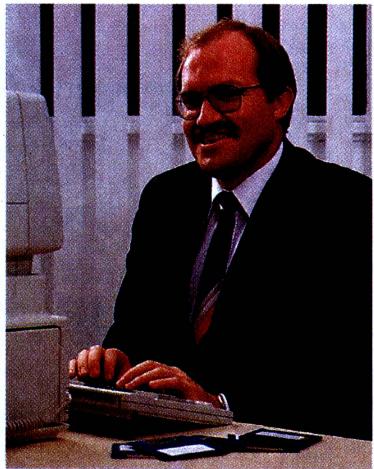
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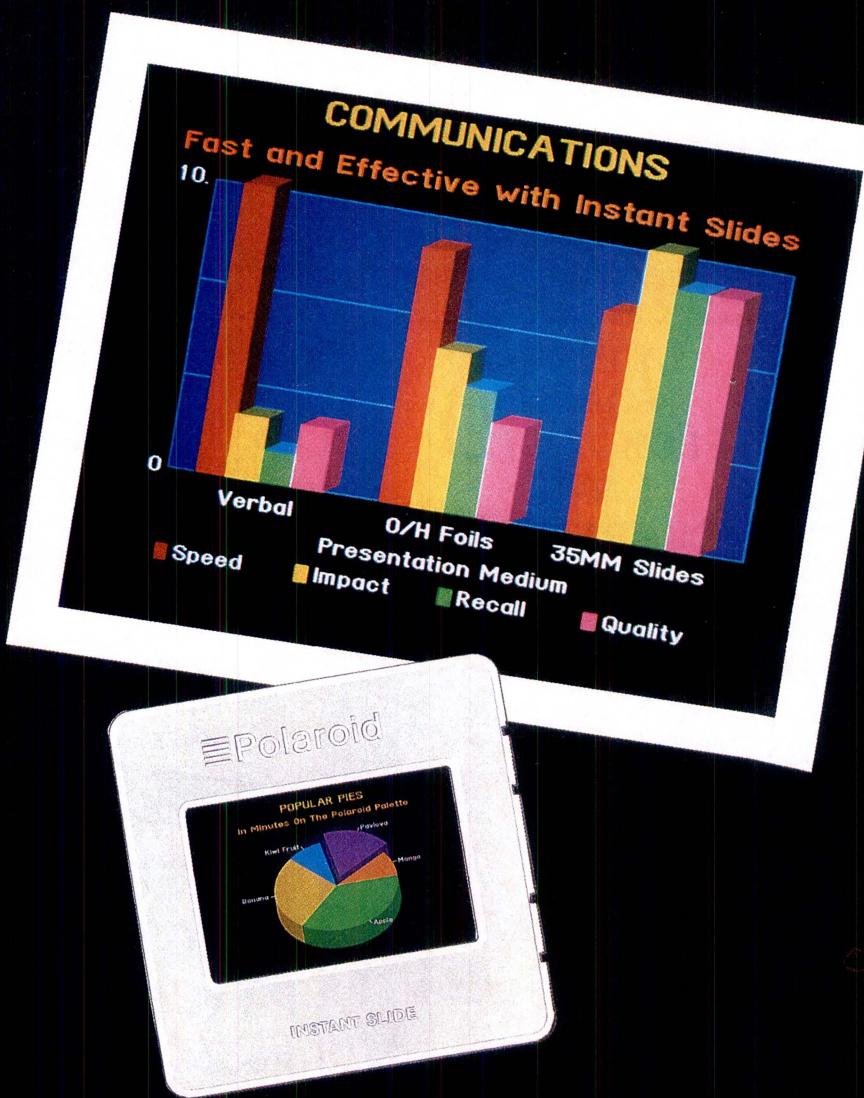
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COMPUTING FOR BIRDWATCHERS

Part 3

Now he's told you what hardware really is, Les Bell continues his newcomers' guide to personal computing by looking at input and output — after all, the only way to get something out of a computer is to put something in first . . .

IN THE LAST article in this series, we looked at how the central processing unit of the computer is able to perform arithmetic and logic through the execution of a sequence of instructions stored in memory (otherwise known as a program). However, being able to perform the most intricate and complex calculations is no use at all if the results cannot be communicated with the outside world somehow. My description of a program also begs the question — 'How does the program get into the computer in the first place?'. A computer that has no connection with reality would be of little use.

So this month, we look at input/output (or I/O for short) — the art of getting data and programs in and out of the computer's memory. As so often happens in the world of computing, there is a number of ways of getting this done.

The simplest way, the one used on most computers in the early days — and indeed, until quite recently — was simply to attach lights to all the individual bits (binary digits) of the computer's accumulator. The pattern of bright and dim lights

displayed the binary number in the accumulator, and a short program could be used to move the contents of memory into the accumulator one location at a time.

Likewise, a row of switches connected to the accumulator could be used to input binary numbers. While at first this was the only form of I/O on computers, in later years it was used only to enter the simplest 'bootstrap' program into the computer, which would then load a program to perform more 'user-friendly' I/O.

It didn't take long for someone to come up with the bright idea of hooking up a teleprinter to a computer so it could print its own results. All the computer had to do was convert its internal binary numbers into a series of characters — something that is easy for a computer to do with the help of a short program.

By the same token, the teleprinter keyboard could be used to enter data.

And so was born the precursor of today's terminals and display screens. At first, the teleprinter used was just that — the same kind of device used for the post office telegraph (later telex) network, with

In essence, the handshaking signals go both ways and signal things like "here's a character" (from computer to printer), "I got that character, so send me another" (from printer to computer) and "I'm tied up printing for a while, so don't send me anything because I'm not listening" (from printer to computer).

no special adaptations for data processing. Only some time later was a new code of characters developed, specifically for computer use. This is the ASCII (American Standard Code for Information Interchange) code, which most computers today understand, although IBM, being IBM, has persisted with its own character code called EBCDIC (Extended Binary Coded Decimal Interchange Code) on its larger machines.

In the ASCII code, each character has a corresponding binary value. For example, the letter 'A' has the value 65, 'B' has the value 66, and so on. Notice the computer distinguishes between upper case and lower case letters: the values of the lower case letters are 32 higher than the corresponding capitals, with 'a' being 97.

One Plus One Equals 98?

It's also important to notice that the digit characters do not have the same values as the numbers they represent. For example, binary 0 is 0, while the character '0' has the value 48, '1' is 49 and so on. This means that outputting a binary number requires it to be translated into the corresponding sequence of character values —

not a very difficult task.

For a long time, the only ASCII input/output devices available were teleprinters, of which the best-known example was the ASR 33 Teletype, a 10 characters-a-second printer with a mechanical keyboard which precluded any semblance of touch-typing. The advantage of the ASR 33 over the cheaper KSR 33 was the paper-tape punch and reader on the side, which, on some computers at least, was the only form of storage for programs and data while the machine was switched off.

Since it was almost entirely a mechanical device, the ASR 33 was incredibly noisy as it bashed away. Loading programs off paper tape could take 20 minutes or more, so the computer was switched off as infrequently as possible.

Punched paper tape is essentially a stream of thin punched cards, an earlier form of storage based on the cards which controlled Jacquard's looms.

In the Sixties, someone saw the opportunity to adapt television technology to display text, and the earliest video display terminals were produced. Having no moving parts, VDTs are faster and more reliable than printing terminals. For example, while the ASR 33 had a top speed of 10 characters a second, the terminal I am typing this on can (and does) communicate at 1920 characters a second!

Meanwhile, back at the ranch: how does the computer communicate with these devices? The answer lies in special mechanisms called I/O ports. These are registers attached to the CPU which, instead of turning lights on or off, send the data to (or receive it from) the attached displays and printers.

In order to send a string of characters, presently stored in memory, to a remote display, a typical small computer must retrieve each character in turn into the accumulator, then test a bit on the I/O port to sense whether or not the port is ready to accept a new character (it must have completed the task of sending the previous character — which takes time). If the port is ready, the character is sent to the I/O port, usually by a special output instruction.

Large computers do not just have I/O ports, they have I/O channels. Such a

channel has a channel controller, a special computer which performs all the house-keeping tasks of talking to remote devices, leaving the CPU free to concentrate on number-crunching or whatever the real task at hand is. Such a computer, rather than sending individual characters to the port, simply tells the channel controller the address of the string of characters in memory, and then instructs it to send them while it does something else.

Connection Standards

The connections between the I/O port and the terminal or printer essentially fall into two categories: parallel and serial. In a parallel connection (or interface), the data is sent over multiple wires, usually eight at a time, together with associated signals to perform what is known as handshaking. In essence, the handshaking signals go both ways and signal things like "here's a character" (from computer to printer), "I got that character, so send me another" (from printer to computer) and "I'm tied up printing for a while, so don't send me anything because I'm not listening" (from printer to computer).

The best-known form of parallel connection is the so-called Centronics interface, which is often used to link PCs to printers. Centronics is a manufacturer of small printers which pioneered this form of interface, and other manufacturers have copied its form of wiring (although it is not a formal standard and sometimes PCs resolutely refuse to talk to printers due to mysterious incompatibilities).

The other form of connection is the serial interface, in which data is sent over a pair of wires — one wire for each direction — along with some other handshaking signals occasionally used with modems and printers. The most common form of wiring for serial interfaces is the RS232C standard, which defines what the various pins on a serial interface do.

Serial interfaces are commonly used to link terminals to computers, and are less commonly used to link computers to printers. The main advantage of a serial interface is that it can use a longer cable (up to about 15 metres) than a parallel interface, allowing devices to be remote from the computer.

The serial interfaces on PCs are most

BIRD WATCHING

*Inside a VDT these days
you'll find a
microprocessor, memory
and an I/O port with some
special video circuitry
attached which is for the
most part a duplication of
the PC's own circuitry.*

often used to link to a modem, allowing the computer to communicate over the phone lines, or to talk to some other more unusual peripherals such as plotters.

On personal computers, an external terminal is a rarity. Most PCs include the electronic circuitry which generates the terminal display inside the computer itself, so all that is required is a display screen, rather than a complete terminal. This makes sense, because inside a VDT these days you'll find a microprocessor, memory and an I/O port with some special video circuitry attached which is for the most part a duplication of the PC's own circuitry. On the other hand, because one processor has to both perform calculations and update the screen, PCs are often slower at screen update than systems with external terminals. If you don't believe me, watch an IBM PC scrolling the screen.

Faster Graphics

However, because the screen of a PC is directly connected to an area of the PC's memory, there is no special output required at all. This means that for graphics displays, PCs are faster than external terminals, and often lower in cost.

The PC's keyboard may be attached through either a parallel or a serial port in the conventional fashion.

Of course, there are other forms of communication between computers and input/output devices, but these must wait till later in our series.

Next month, we will continue with a look at mass storage devices. □

Decimal	ASCII	Hex	Decimal	ASCII	Hex	Decimal	ASCII	Hex
0	NUL	00	44	,	2C	88	X	58
1	SOH	01	45	-	2D	89	Y	59
2	STX	02	46	.	2E	90	Z	5A
3	ETX	03	47	/	2F	91	[	5B
4	EOT	04	48	0	30	92	\	5C
5	ENQ	05	49	1	31	93	]	5D
6	ACK	06	50	2	32	94	^	5E
7	BEL	07	51	3	33	95	—	5F
8	BS	08	52	4	34	96	‘	60
9	HT	09	53	5	35	97	a	61
10	LF	0A	54	6	36	98	b	62
11	VT	0B	55	7	37	99	c	63
12	FF	0C	56	8	38	100	d	64
13	CR	0D	57	9	39	101	e	65
14	SO	0E	58	:	3A	102	f	66
15	SI	0F	59	;	3B	103	g	67
16	DLE	10	60	<	3C	104	h	68
17	DC1	11	61	=	3D	105	i	69
18	DC2	12	62	>	3E	106	j	6A
19	DC3	13	63	?	3F	107	k	6B
20	DC4	14	64	@	40	108	l	6C
21	NAK	15	65	A	41	109	m	6D
22	SYN	16	66	B	42	110	n	6E
23	ETB	17	67	C	43	111	o	6F
24	CAN	18	68	D	44	112	p	70
25	CR	19	69	E	45	113	q	71
26	SUB	1A	70	F	46	114	r	72
27	ESC	1B	71	G	47	115	s	73
28	FS	1C	72	H	48	116	t	74
29	GS	1D	73	I	49	117	u	75
30	RS	1E	74	J	4A	118	v	76
31	US	1F	75	K	4B	119	w	77
32	SP	20	76	L	4C	120	x	78
33	!	21	77	M	4D	121	y	79
34	"	22	78	N	4E	122	z	7A
35	#	23	79	O	4F	123	{	7B
36	\$	24	80	P	50	124	|	7C
37	%	25	81	Q	51	125	}	7D
38	&	26	82	R	52	126	7E	
39	'	27	83	S	53	127	DEL	7F
40	(	28	84	T	54			
41	)	29	85	U	55			
42	*	2A	86	V	56			
43	+	2B	87	W	57			

Reviews

Version 4.1 — Wordperfect 101

Speaking of word processors — here's a rerun of an old favourite. Debbie Brown isn't at all nostalgic about the removal of some bad old scenes. In this review she outlines new developments in the plot, and leaves us with an overall good impression.

Zenith Z-171 Portable 104

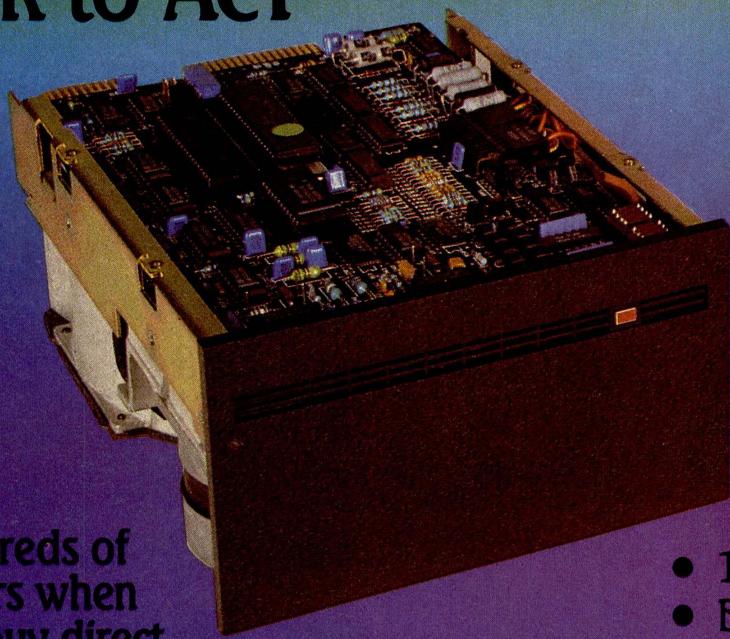
As far as we can see, this machine hasn't taken portable computing to the "highest point of the celestial sphere". It has a liquid-crystal display, a number of utilities in non-volatile RAM, two 13 cm disk drives — in fact it looks very much like some of the other laptops we've seen lately . . .

Turbo Lightning 112

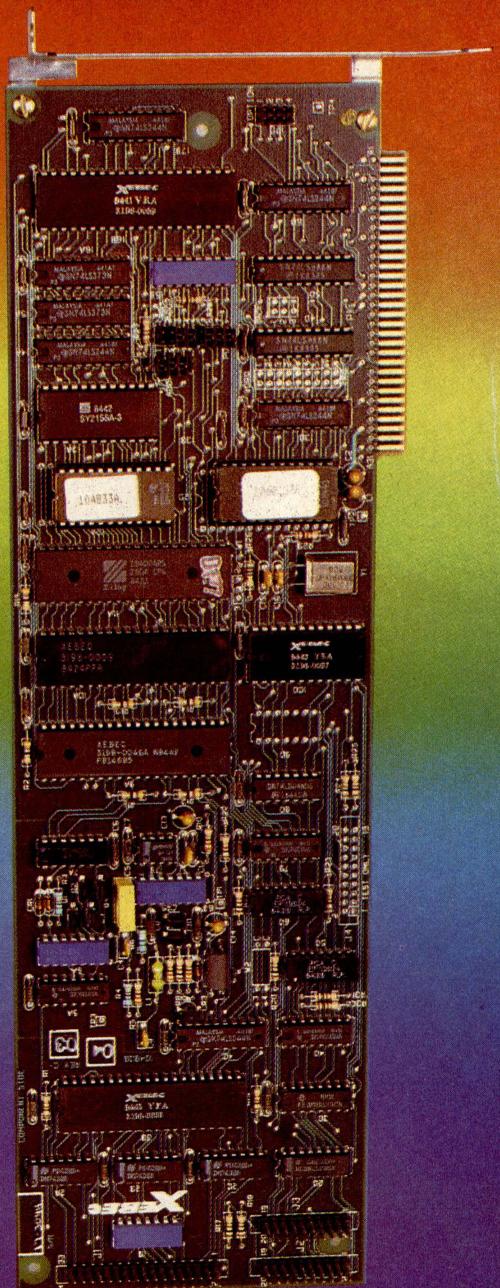
Faster than hand-to-eye-to-hand co-ordination, more pedantic than a sub-editor, and more oddly named than any other product in this section — it's an extremely useful, innovative, well-designed program.

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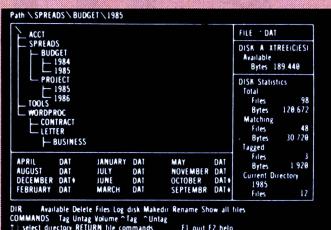
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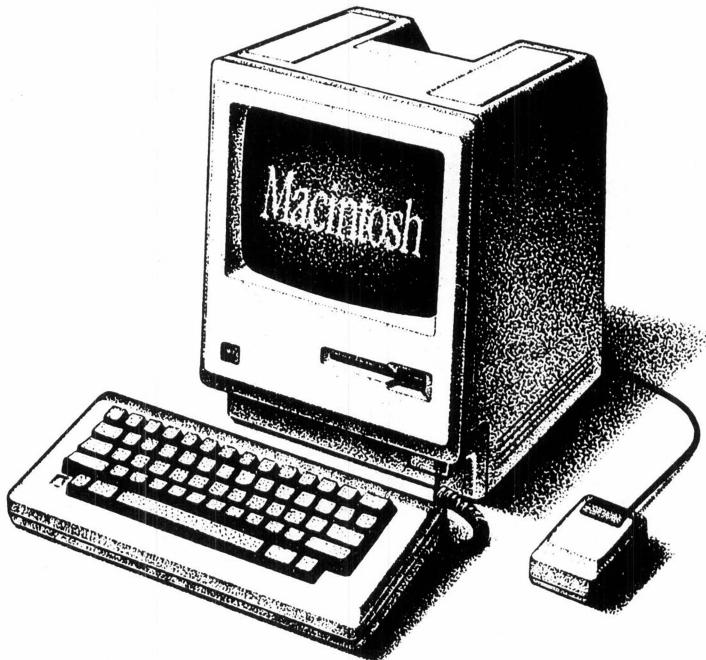
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WORDPERFECT

Version 4.1

ALMOST WORDPERFECT

Although Debbie Brown still wouldn't quite agree with the name of Wordperfect 4.1, she would recommend it on the whole as a near-to-perfect word processor.

WHEN I WAS asked to review the latest version of Wordperfect, I welcomed the opportunity for further involvement with a package which had impressed me in the past. Wordperfect 4.1 was no disappointment.

Wordperfect 4.1 arrives on five diskettes and will run on the IBM PC, XT, AT and most compatibles. Sorceware, a local distributor of PC products, announced Wordperfect would also be available for the NEC APC. Wordperfect 4.1 requires 256 Kbytes of RAM and a minimum of two double-sided floppy drives.

I doubt there could be a user of Wordperfect who hasn't complained about the intolerable, nearly blinding Reveal Codes screen. I am pleased to announce the screen handling in this mode has finally been rectified. The Reveal Codes screen now incorporates a window facility which divides the screen to enable viewing of a document and the document with the format codes at the same time. In addition, all cursor-control keys are now operational in this mode.

Considerable modifications have been

made to the List Files screen. A command for copying a document (surprisingly never included in previous versions), a Look command and a Word Search command are all included in Wordperfect 4.1. The Look command allows the user to look at a document, then return to the one they were editing. The Word Search command will search for a word or string of text through all files on disk at remarkable speed. The default directory can now be changed from within the List Files screen; a directory can be displayed using wildcard characters and a file can be selected by typing the necessary characters of a filename.

The Shell, a new command, allows the user to access DOS without leaving Wordperfect; I found this particularly useful when working on a document and discovering I had run out of disk space. Through the Shell command, I was able to go to DOS, format a disk and return to my document as if nothing had happened.

Choice of Printers

Wordperfect now has 192 printer drivers,

but only 94 of these are fully supported due to limited printer capabilities. The printer can be accessed directly with the 'TypeThru' command, which has a similar effect to using a typewriter. Text can be sent to the printer by a character or by a line.

The spool queue now has an interrupt facility which allows an urgent job to be given priority in the printer queue.

Proportional spacing has been improved so that each character's width on the screen is recognised, in order to facilitate more even spacing on the printed page.

As another new feature, the 'Screen' displays a menu of new options. Up to two windows can be created through the Screen Window command by indicating the line number where the screen is to be divided. The screen is separated by a ruler, which displays the tab and margin settings of the current document.

A Line Draw command allows limited graphics applications: lines, boxes, and shading can be created in conjunction with the arrow keys. Colour can now be se-

WORDPERFECT

lected for the background, foreground and underline (inverse video is included). The extended ASCII character set can be accessed and the CTRL and ALT keys can be defined to store the special characters.

The Sorter, previously an optional extra, is included in Wordperfect 4.1. It will sort lines, paragraphs, blocks of text and secondary merge files in both alphabetical and numerical order.

Good Thesaurus

An impressive thesaurus is also included in 4.1. The thesaurus displays up to three words and their references on the screen. Words which appear with a full stop to their left are termed 'head words' and can be selected to display further reference words. Sourceware advised us that the thesaurus dictionary, which is American, consists of approximately 150,000 words. The Spell dictionary has been changed to British and has been increased to a substantial 115,000 words.

Initially, I found it awkward adjusting to the enhancements of the Cancel key in 4.1. The Cancel command will now restore up to three prior deletions. As a result of my tendency to press the Cancel key whenever in difficulty, I found I was haunted by the continual appearance of the undelete options.

Centre, flush right, super/subscript, protect and sort functions can now be implemented on a block of text. The block key, which previously acted as a toggle switch only, can now also be turned off with the cancel key.

Wordperfect can now also convert files from and to Wordstar, Multimate and DCA.

The repeat function will now repeat letters, and the Goto command, given twice, will take the cursor to its original position.

The insert date feature includes the time, and the Insert function is included as an additional option. When the Insert function is used, Wordperfect will upgrade the date so that whenever a document where this command has been used is retrieved or printed, the current date will appear (that is, the system date).

Caps and Num Lock indicators appear on the status line. Whenever the Num Lock key is pressed, Pos (which represents the column position) will flash on and off; when Caps Lock is pressed, Pos will appear in upper case.

While working on a large document I discovered a problem using the Starting

Wordperfect allows you to lock a document by assigning a password, but the facility for unlocking a document doesn't work!

This problem is not unique to 4.1, so if you haven't discovered it by now, chances are it probably won't be of much concern to you.

Page Number command. When you assign a new starting page number, the new number is displayed on the screen and each subsequent page is renumbered accordingly. The problem arises when printing a page which succeeds a new starting page number: Wordperfect will ignore the new page number, acknowledging only the true page of the document. There are two solutions to this problem: manually count the pages through your document, or position the cursor on the page to be printed and select the Page Print command. However, to manually count the pages is obviously too time-consuming and the problem with using the Page Print command is that the spool facility cannot be used.

Wordperfect allows you to lock a document by assigning a password, but the facility for unlocking a document doesn't work! This problem is not unique to 4.1, so if you haven't discovered it by now, chances are it probably won't be of much concern to you. The security purpose for locking a document is partly defeated any-

way, as a locked document can be deleted without giving the password.

The time-saving macro feature, for storing frequently used keystrokes, can now be defined to include a delay value, allowing the macro to pause for user input. In addition, the keystrokes of a macro, which are not visible under normal conditions, can incorporate the pause command when text, menus or prompts are to be displayed during a macro operation.

Documentation and Training

The documentation supplied with Wordperfect 4.1 has been improved, but I feel anyone who anticipates the Learning section in the manual will be of much assistance will find it disappointing.

On the training side, Sourceware has advised that Wordperfect courseware is now available. Practical Software, an independent training organisation in Melbourne, has also announced it is now running introductory and advanced classes in Wordperfect.

The Quick Reference card, which lists all Wordperfect commands, has been structured in a more logical manner than its predecessor.

As a result of the additional features of Wordperfect 4.1, naturally the keyboard template has been significantly changed. The Rewrite command is no longer shown on the template, as the screen automatically rewrites. The command for a soft hyphen is incorrectly listed on the template as Home and Spacebar, which are in fact the new keystrokes for a hard space. As the keyboard template is such an integral part of the operations of Wordperfect, I feel more consideration is definitely warranted in its design.

Contrary to what the name suggests, I feel Wordperfect is not the perfect word processing package, although with Version 4.1's substantial improvements and additional features it certainly comes close. Highly recommended. □

Program:
Made by:
Hardware required:

Price:

Review copy from:

Available from:

Wordperfect Version 4.1.
Satellite Software International.
IBM PC/XT/AT and most lookalikes, DOS 2.0 and over;
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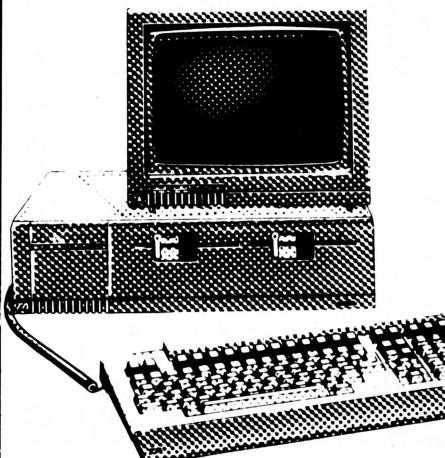
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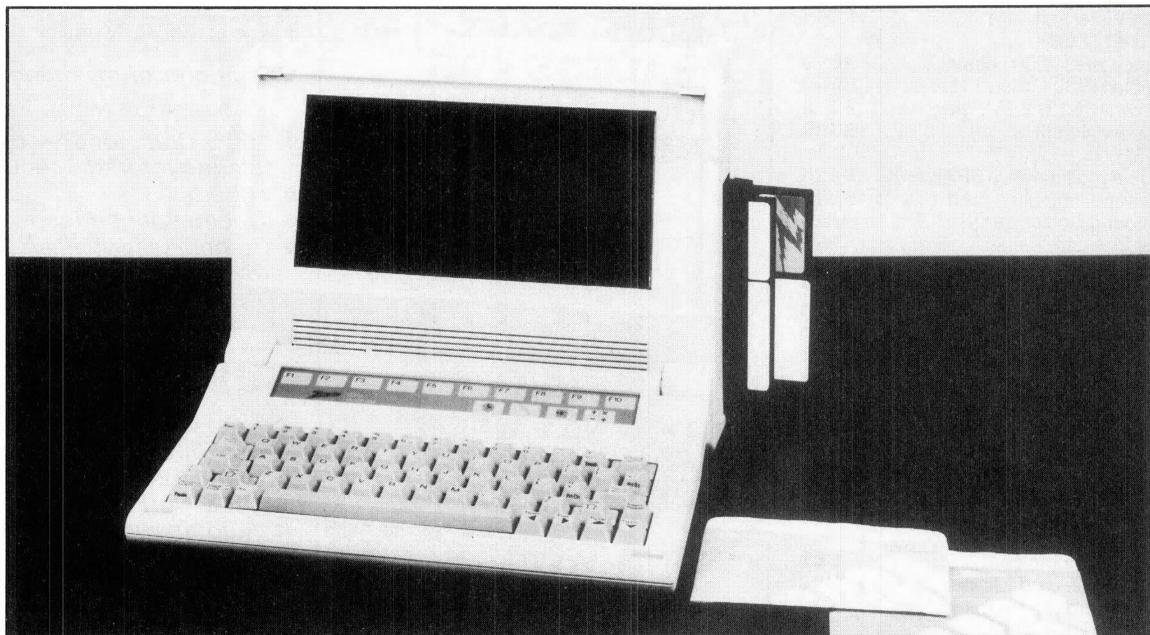


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ZENITH Z-171 PORTABLE

Apart from a few well-chosen words to say about the liquid-crystal display, Ewart Stronach found the new Zenith portable a good contender in the growing portable market.



THIS ONE'S cream-coloured and has a different badge, but it sure looks like the Morrow Pivot we examined for the Personal Computer of the Year judging. And, come to think of it, the Morrow sure looked like the Osborne 3 we reviewed last year...

No, it's not another cloning — it's badge engineering, a rarity so far in the computer field but an approach we'll see more often in the future. After all, it's a great way for low-volume manufacturers to produce high-volume machines and enjoy the associated economies of scale.

The design, originally developed for Morrow (which also makes the Zenith version), is now produced in the Silicon Valley pioneer's San Leandro factory. Zenith's successful tender to the US Internal Reve-

Without a number pad, operation of the calculator is controlled by the use of a group of keys based around JKL. This took a little getting used to.

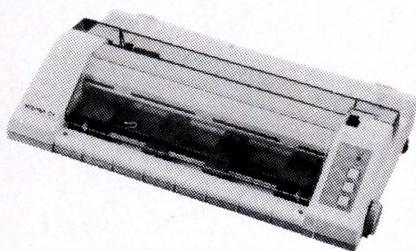
nue Service — for a minimum of 15,000 of these machines — may even lead to Zenith taking up manufacture of the machine itself.

The Zenith, labelled the Z-171, is (like its brothers) a truly portable, 16-bit, MS-DOS, IBM-compatible computer. It is handled locally by Anitech, a division of Australian National Industries.

A good-looking little unit, when closed for transportation it's compact and easy to carry with its built-in shoulder strap. To operate, you place it narrow end down on a desk (or on your lap), and the front panel hinges downwards to reveal a green liquid-crystal display measuring 24 cm by 10 cm. The portion left lying flat contains the keyboard, which because of its size differs greatly from the now familiar IBM layout.

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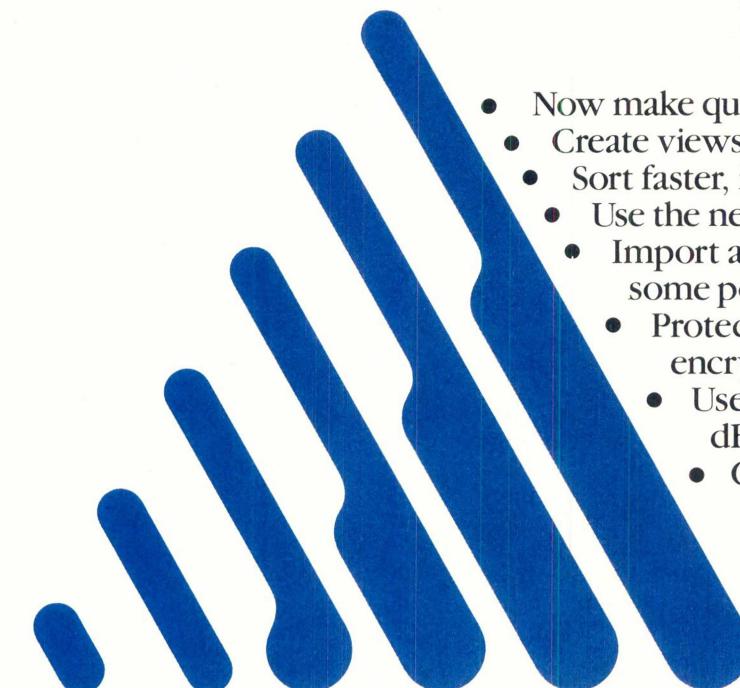
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The keys are sculptured and well marked with a nice 'feel' and just enough click action to let you know when you've struck one. All the normal keys are present, but no numeric pad. A good-length space bar has the scroll lock, caps lock and alt keys to the left, and four cursor-control keys to the right; the shifted use of the cursor keys allows home, end, page up and page down.

Above the keyboard on a slight slope towards the screen is a row of soft-touch calculator-type keys for function keys and four 'icons': a clock face, a telephone, a diskette and a calculator symbol — more on these later. The disks are inserted in the right side of the main unit and the power switch and brightness controls are on the left.

When the computer is switched on the screen flashes, then displays 'Testing Memory'. The test unit was equipped with an optional 640 Kbytes, and the test took about eight seconds. After this the battery-backed memory takes over and displays the current month's calendar, the time and a map of the world: just the thing for those with a new portable computer and no idea where to take it.

Where Are You, Matt?

The function keys allow you to advance the calendar and to shift through the world's time zones, displaying the time in major cities across the globe. A built-in diary function allows you to enter appointments and set an alarm call at the appropriate time; it was obvious the test model had come via the *Your Computer* office, as the diary for the day before I got it had the plaintive message at 10 am, "Is Matt in yet?"

When the map is displayed, function key 10 allows access to a set-up mode, which lets you set the time and date, choose an external monitor and toggle the screen saver, which turns off the screen after a period of no keystrokes to conserve batteries. Your type of printer can also be selected and details of baud rate for modem and serial port configured. All these parameters are stored in non-volatile memory and exist at next power-up. Exiting from the set-up mode brings you back to the map.

The next icon is a picture of a telephone, and pressing this gives access to an auto-dialling program from a telephone list, with redial facility and a call timer. Once contact is established, func-

The battery-backed memory displays the current month's calendar, the time and a map of the world: just the thing for those with a new portable computer and no idea where to take it.

tion key 9 drops you into the terminal mode for modem communication.

When you press the diskette icon your DOS disk is booted. If you call another function after booting, the secondary function, be it the ubiquitous map or your phone dialler, appears on the screen and your main program halts until you press the diskette icon again.

The last icon is the calculator, which displays a calculator format as an overlay of any currently running task. Without a number pad, operation of the calculator is controlled by the use of a group of keys based around JKL. This took a little getting used to. The calculator can be called while using another program, such as a word processor, and the result of your calculation stored as a named variable and automatically inserted in your text.

These battery-backed utilities make the machine easy to use and will certainly prove invaluable to many users. They are very similar to the program Sidekick in their operation, and I for one never turn my computer on without loading Sidekick.

The non-volatile RAM required to run this suite is 4 Kbytes, and should be able to handle a fair-sized notebook and phone index. The machine has provision for an inbuilt modem, and the auto-dialling function would really come into its own for remote terminal use in the field. I feel perhaps the strongest point in favour of this type of truly portable unit is its application in remote areas. I see it being of inestimable use to engineers or surveyors.

Seeing Things from the Right Angle

The screen with its liquid-crystal display is impressive, although I feel this type of display still has a lot of development in front of it. The main drawback is you must be at exactly the right angle to get a good view

of what's on the screen; it's almost impossible for two people at once to watch what's happening.

The contrast control adjusts the brightness relative to the viewing angle, and when set for a single user in the best possible position is unreadable from above or below. The back-lighting of the liquid-crystal display makes the screen visible in quite bright surrounding light, but it is at its best in subdued light or indoors.

The face of the display is soft plastic with a layer of liquid under it, and running your finger over the screen leaves a trail which fades almost instantly. I can't comment on the durability of this front layer, but it feels very soft to the touch and I don't think it would take kindly to harsh treatment.

The graphics resolution is grainy but good, and the overall effect is totally usable but not in the same league as a sharp cathode ray tube. I can't help but feel the screen is both the unit's strength and weakness: the development of the LCD screen is what has made the machine available, but unless I had a very specific need for ultra-light portability, I would opt for something with a clearer display.

You can drive a colour or monochrome monitor, but only under mains power, and this rather destroys the portability aspect.

Outside Looking In

For those of you with technical minds, let's look inside. The Zenith Z-171 is driven by an 80C88 CMOS 16-bit processor operating at 4.77 MHz. The operating system is MS-DOS 2.11 or 1.25, though it quite happily swallowed any other version I threw at it. The standard memory is 256 Kbytes, expandable to 1 MByte. (If you filled the 1 Mbyte of available RAM, would it become too heavy to carry?) There are 32 Kbytes of ROM.

The disk drives are standard 13 cm double-sided, double-density floppies. They format to 48 tracks per inch, nine sectors per track, are PC-DOS compatible, and are shock-mounted for portability.

The display is normally 25 lines of 80 characters with 640 by 200 dot-addressable pixels; the character cell is 64 pixels (8 by 8). It displays the ASCII 95-character subset, with full descenders on lower-case letters, and reverse video. The video output for an external monitor includes RGB with intensity control and composite monochrome. A standard-pin D connector is provided for RGB.

ZENITH PORTABLE

The I/O ports include a serial port with a male DB25 RS232C connector. Baud rates and data bit settings are user definable, with baud rates from 110 to 19,200. The parallel port is female DB25, Centronics compatible. A video-out port with an RCA phono jack allows composite video output.

The unit weighs 6.3 kg, and when closed measures 24.1 by 33 by 16.8 cm, with the keyboard forming a protective front panel. The power requirements are 115/220 V AC; 50/60 Hz with a 12 V DC rechargeable battery pack. The test unit would not accept a battery charge of any consequence and ran for only about half an hour before warning me to SAVE DATA NOW!

Optional attachments include a light-weight nylon water-resistant carry bag, battery pack, video card and 256 Kbyte memory upgrade sets.

To sum up, the machine has a very real place in portable computing. It is relatively light and easy to carry, and its built-

The Zenith stands with the best of the portables for the person on the move who has the ability to change to a full-size machine when he or she returns to base.

in communication programs add to its relevance. It is not a machine I could be happy with as a standalone office unit because of the screen and, as I mentioned earlier, to add a monitor destroys the purpose of a portable. It stands with the best of the portables for the person on the move who has the ability to change to a full-size machine when he or she returns to base.

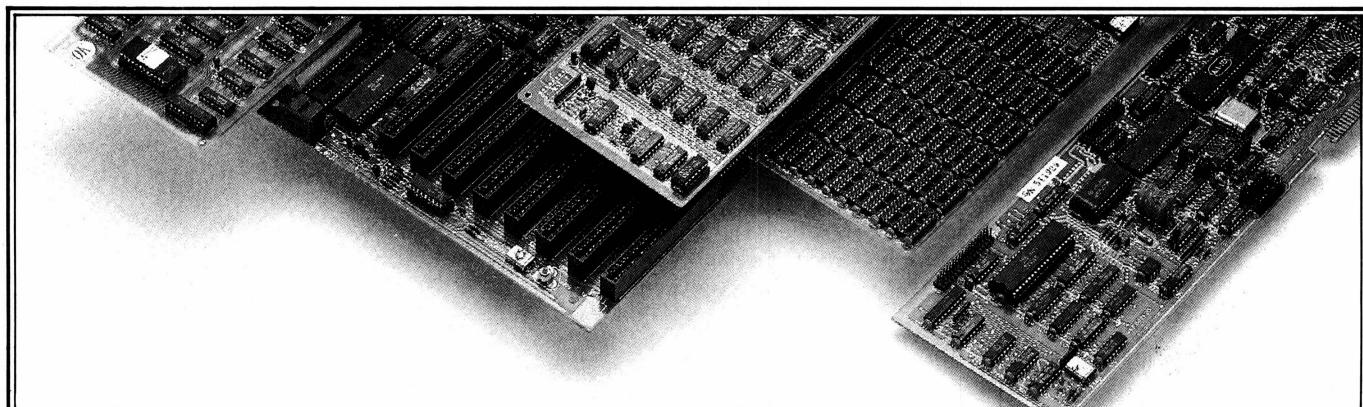
The price structure at a recommended

retail cost of \$4995 reflects the relatively new technology of the screen, but by today's standards I find this high price hard to justify against competitive models. There is no mention of a software package with the unit.

Zenith Z-138 PC

The second Zenith provided for review was a new transportable IBM workalike. Ho-hum.

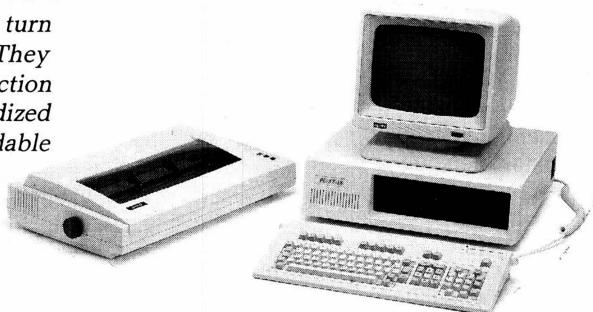
It looks like a Bondwell and works like an IBM. It runs an 8088 at 8 MHz (switchable to 4.77 MHz) and comes standard with 256 Kbytes of RAM. The front panel lifts off to become an IBM lookalike keyboard, and reveals an amber screen that could be a lot bigger considering the amount of case around it. It weighs 10.9 kg — hence the term transportable rather than portable. At a recommended retail price of \$3995, it joins a growing list of similarly configured machines, and only the name Zenith separates it from lesser-known brands. □



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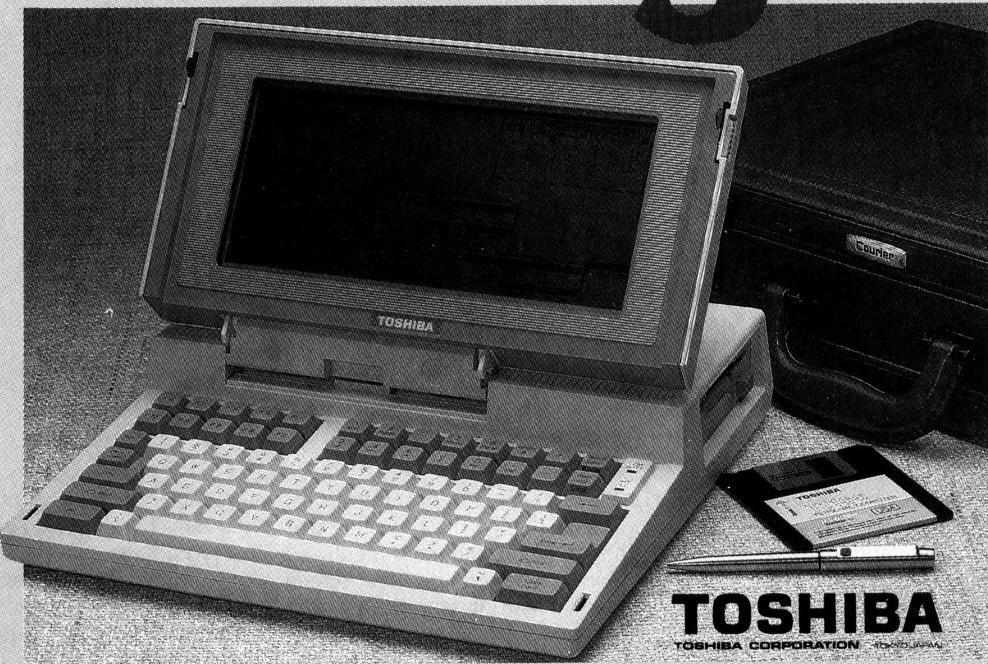


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TURBO LIGHTNING Spelling Checker and Thesaurus

You might think Les Bell is a champion speller, but you've never seen what his copy looks like before our editors get to it. Here he reveals one of the new tools of his trade that helps him keep up the journalistic front.

TURBO LIGHTNING is an example of the co-resident software which has gained in popularity over the past couple of years. The best example of this kind of package is Sidekick, a memory-resident program which provides a notepad/editor, calendar/diary, calculator and other tools accessible from within other programs. Now the creator of Sidekick, Borland International, has released a new example of powerful co-resident software, Turbo Lightning.

Lightning sits between the keyboard and any applications running on an IBM PC (or compatible), and monitors incoming keystrokes as they are typed. It does not interfere with the operation of applications, but watches for the spaces which mark the ends of words and, as it sees each word, looks up its spelling in a dictionary. If it cannot find the word, it beeps to warn the user he or she may have misspelled a word.

Lightning maintains a small memory-resident dictionary in order to take up as little space as possible, so it can be co-resident with today's huge word processors. With only 6000 words in this dictionary, it quite often beeps at correct words, but this is only a minor annoyance. Those who have plenty of memory can install a 12,000- or 16,000-word version to cut down the beeping.

The main dictionary is maintained on disk; a small version is used on floppy disk systems with a larger version for hard disk users. This dictionary is invoked whenever the user requests a spelling check and correction of either a word or the entire screen.

Lightning is invoked by pressing the Shift and F8 keys; if this conflicts with

some of your software (for example, Volkswriter) you can change the keycodes arbitrarily. This brings up the main menu as a window over the top of the screen. Choices are: Environment, Word-check, Full-screen-check, Thesaurus, Setup and Options.

Pressing the right and left arrow keys followed by return, or pressing the initial letter of one of these selections, displays a pull-down menu blind. For example, the Word-check option offers:

A: Check word at cursor

The full-screen-check menu makes the program scan the entire screen, highlighting misspellings. This whole process takes only a few seconds.

B: Check last bad word

Pressing either A or B, or moving the cursor till it is highlighting the appropriate choice, will cause the appropriate action. Selection A will make Lightning check the spelling of the word under or immediately before the cursor and suggest possible correct spellings. A window opens in a corner of the screen with a list of 'sound-alike words' which are possible corrections, and again, either moving the cursor up or down or pressing the appropriate letter will result in the word being replaced in the screen text. Alternatively, one of the options on this menu allows the adding of the (correct) word to the

auxiliary dictionary.

The 'check last bad word' option is used if you have typed several words since Lightning beeped, and causes the program to back up to the last bad word, perform checking and correction, then return to the end of the text to resume typing.

The full-screen-check menu makes the program scan the entire screen, highlighting misspellings. This whole process takes only a few seconds, probably due to the indexing of the dictionary file. A minor annoyance is that Lightning really does check the full screen, including Wordstar's status line and the function key labels at the bottom of the screen. However, this is easy to live with.

Handy Thesaurus

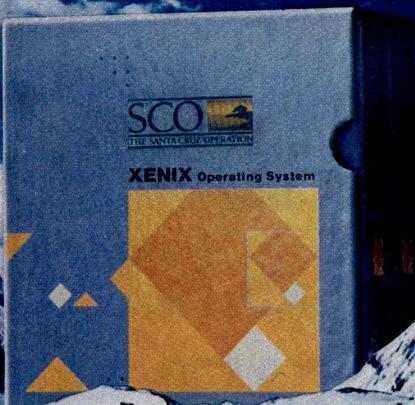
An important feature of Lightning is its thesaurus. The traditional Roget's Thesaurus is a handy tool for writers, who are always seeking a new way to put something. But its days must be numbered with the advent of the electronic equivalent. Or, to put it differently, a significant aspect of Lightning is its synonymicon. The conventional Roget's Thesaurus is an effective instrument for authors, who are perpetually pursuing a fresh manner to express something. As you see, writing a sentence is the work of just a few moments using Lightning.

The thesaurus is surprisingly complete. For example, the thesaurus entry for 'way' lists 22 alternatives such as manner, fashion, habit, custom, practice and so on. If a word is not in the thesaurus, Lightning will suggest it looks up similar words. In fact, there are 5000 primary reference words in Lightning's version of the Random House Thesaurus, and it contains 50,000 synonyms.

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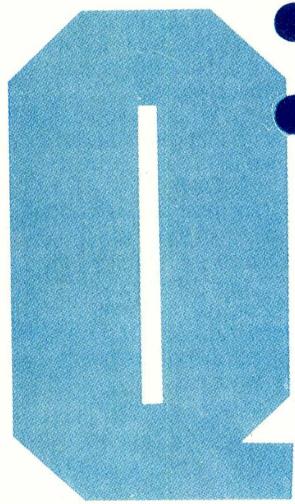
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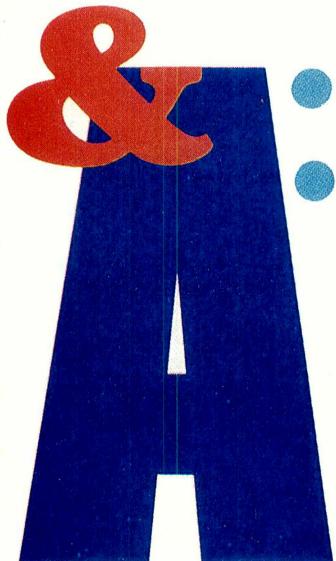
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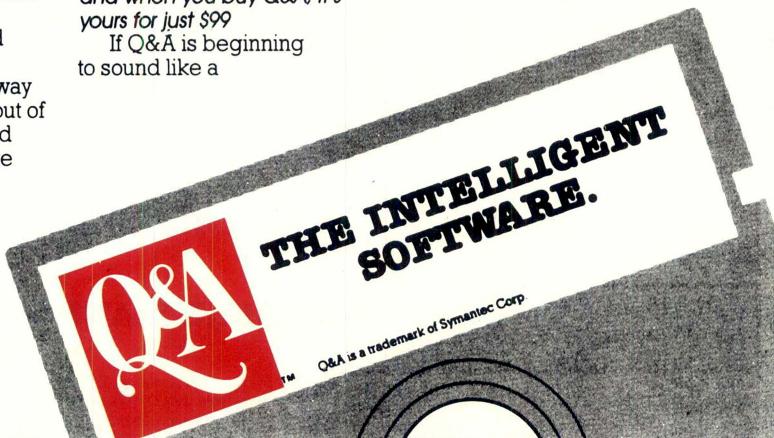
good investment to you, a quick demo should convince you.

Go to your local Q&A dealer and ask for one.

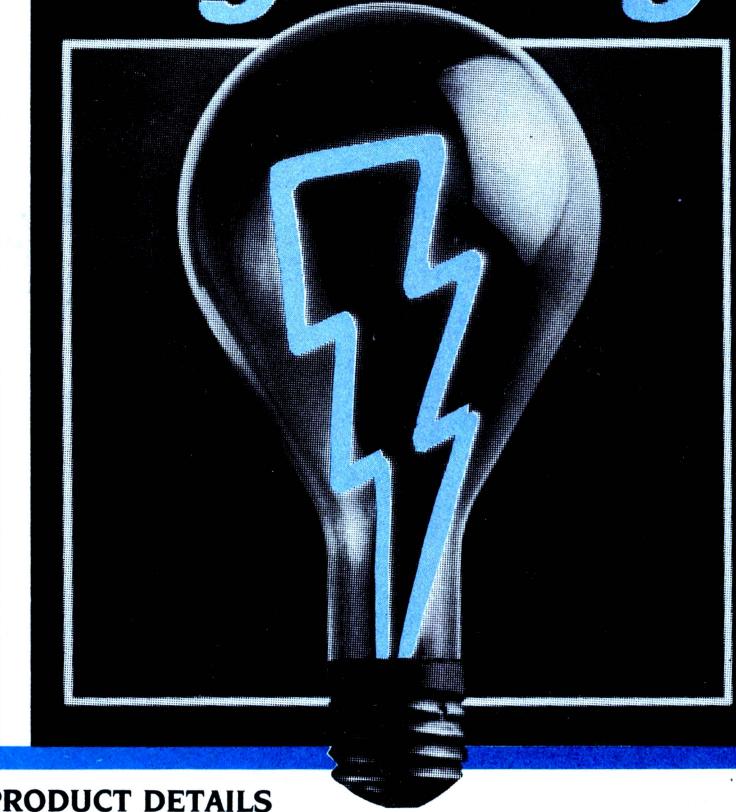
For more information on Q & A and What Is analysis call International Solutions Pty. Ltd., P.O. Box 269, Broadway 2007. Phone: (02) 319 1488 Telex: AA25331

We think you'll be glad you did.

Call it a hunch.



TURBO Lightning



Use It Almost Everywhere

Turbo Lightning has many options for installation. As supplied, it works with PC-DOS, Wordstar, Multimate, PFS Write, Microsoft Word, IBM Display Writer, Wordperfect, Volkswriter Deluxe, Sidekick, Lotus 1-2-3, Turbo Pascal and Reflex. However, the Environment menu contains an option to allow you to change the operating environment by specifying the various keycodes used by your favourite application program for cursor movement, insert mode toggle and other functions. By following the instructions, you can customise Lightning for virtually any application.

An options selection on the main menu allows enabling and disabling of auto-proofing and redefinition of the hot keys which invoke the program. If you use the thesaurus frequently, for example, you might want to access that function directly with the Alt-F6 key sequence (or any other sequence you choose).

There are 5000 primary reference words in Lightning's version of the Random House Thesaurus, and it contains 50,000 synonyms.

Turbo Lightning will also work with Borland's other products, Sidekick and Superkey (although you can chew up a lot of memory that way). In addition, Borland will shortly release a toolkit of routines for access to Lightning's internals and data files, which will allow programmers to use it to write word games as well as serious applications involving text compression, soundex codes and other goodies built into Lightning.

In particular, this might get around Turbo Lightning's major limitation — it cannot proofread a complete textfile, only screens and individual words.

Nonetheless, Turbo Lightning is a significant and innovative product. Once again, Borland International has shown the others how it should be done; we can expect a number of new products based on the same techniques to appear in due course. □

PRODUCT DETAILS

Program:

Turbo Lightning

Application:

Electronic Reference Library

Supplier:

Arcom Pacific

Brief description:

Interactive look-up system that gives fast, key-touch access to the complete Random House Concise Dictionary and Random House Thesaurus.

Hardware required:

IBM PC or compatibles, IBM XT, AT, or PCjr

Software required:

Wordstar, Multimate, Microsoft Word, and others

Minimum memory:

128 Kbytes RAM

Operating system:

PC-DOS (MS-DOS) 2.0 or greater

User interface Type:

Menu driven

Number of drives:

Two disk drives

Requires hard disk?:

No — but one sure helps

Best points:

Highly interactive, works with almost any software

Worst points:

Cannot check entire document

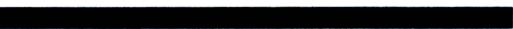
Price:

\$160

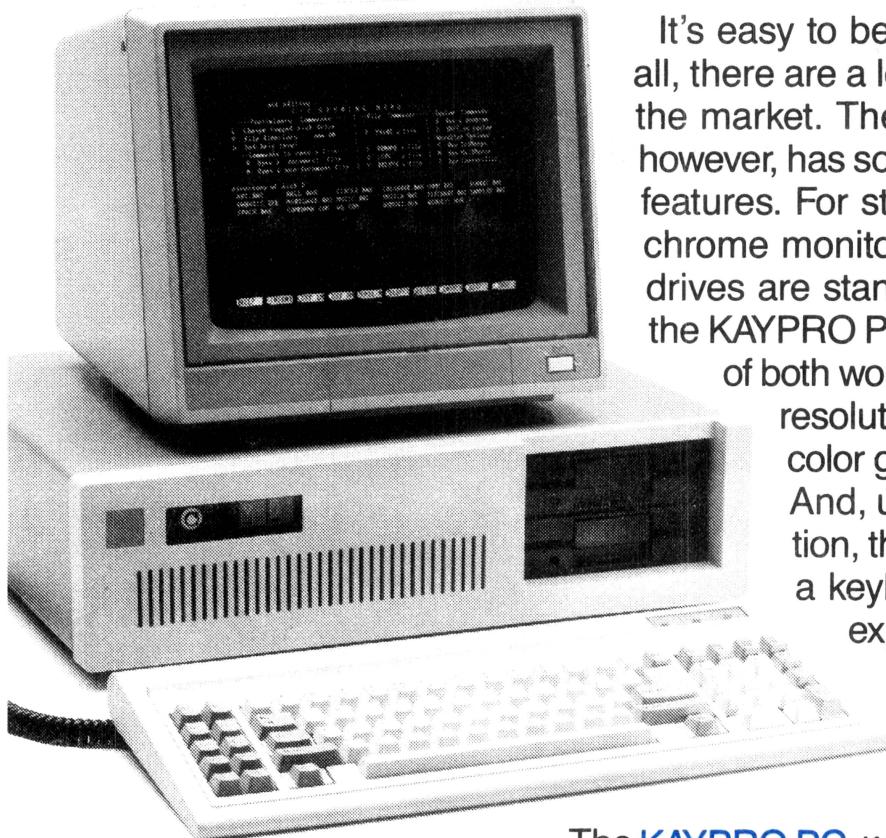
Review copy from:

Arcom Pacific, 252 Abbotsford Road, Mayne 4006;

(07) 52 9522.

RATINGS: POOR GOOD V.GOOD EXCELLENT**DOCUMENTATION****EASE OF USE****DESIGN****VALUE FOR MONEY**

Don't Be Fooled By Expensive Imitations



It's easy to be confused. After all, there are a lot of *beige* PCs on the market. The **KAYPRO PC**, however, has some very distinctive features. For starters, a monochrome monitor and *two* disk drives are standard. In addition, the KAYPRO PC boasts the best of both worlds – perfect high-resolution text and built-in color graphics capability. And, unlike the competition, the KAYPRO PC has a keyboard just like the expensive IBM PC AT – security lock and all.

The KAYPRO PC, with its 8088 CPU and 256KB RAM (expandable to 768KB) delivers 100% IBM PC or PC XT compatibility. It's got nine slots for easy expandability and service. Plus, every KAYPRO PC buyer gets a generous collection of quality business software, including WordStar, absolutely free. Finally, the KAYPRO PC is easily distinguished from the others by the sticker on the box that says "Made in the U.S.A." See the KAYPRO PC difference at your Kaypro dealer. You'll know that **Kaypro Means Business** – and business computers.

PRICE: \$2195* (Dual Floppy)
\$2795* (20 meg.)

Trademarks: IBM, International Business Machines;
WordStar, MicroPro International

*Suggested Retail Price

(Price does not include monitor)

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you nearest dealer call
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New Products	140
This month our favourite car salesman, Ewart Stronach, takes over from Rosie. He's tough. Would you expect him to write about anything which didn't have a price painted in bold luminescence on its windscreen? He's also not interested in any shonky secondhand deals ('new products' which we've run into before), or items which make him fall asleep at the wheel — so make 'em interesting.	
Expert Systems	146
If . . . then . . . well, maybe. That's the crux of the matter; how would you put it mathematically? It's all to do with conditions and probability and a program called EXSYS.	
Your BBC	149
Our Bruce chronicles his favourite machine from times BC to the present ++.	
Your Microbee	150
Colin Tringham dons his fur-lined galoshes in protest against the cold boot, and ploughs his way through a mountain of user group information — SMUG as a bug in a rug.	
Your IBM	152
John Hepworth finds his problems amazing, and ventures, by the light of the moon, to explain the gist of the error messages generated by Format, Diskcopy and Debug.	
Your Bombedwell	154
Some hints to help you cope when your usually reliable luggable bombs out, blows its cool fuse, fails miserably.	
Classified Readings	155
For your eyes only.	
Your C64	156
Commodore deviates get things back to front — that's code language for what they did with their control characters.	
IBM Underground	158
Basically, what John said to his computer went a little like this: "UOPT to work for me? Then UMIND you manners, UFILE, UFORMAT, or you in trouble." The usually spineless IBM replied, "UZAP" and turned John into a SKELETON.	
The Return of Clubfile	160
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Services (no longer required)	176
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NEW PRODUCTS

If you have a genuinely new product or service you would like mentioned in this section, our news editor would like to hear about it. Each month the YC mail box is inundated with press releases vying for a column centimetre or two in 'New Products', so we've instituted a rule to make the selection procedure a little easier: if you include vital details, such as price and phone numbers for publication, your release goes into the pile marked 'editor'; otherwise, it's destined for the pile marked 'shreditor'.

Software

GEM Collection

Arcam Pacific, (07) 52 9522
Price: \$340

A new package from Digital Research that puts words and pictures together, the GEM Collection has three components. GEM Desktop lets the user work quickly using menus, icons, windows and a mouse; it includes a calculator, clock and print spooler. The words come from GEM Write, a fully functional word processor; it can insert graphics into documents, displaying the graphics on screen. GEM Paint allows the addition of pictures, titles and diagrams. The package runs on IBM PCs, XTs, ATs and most compatibles with graphics capability.



PC/TED

Computer Power, (03) 520 5333
Price: \$290

PC/TED is a text editor for the IBM PC and compatibles. It is similar to the mainframe editors, making it attractive for applications which share mainframe facilities. The program has the ability to edit up to four files at once, with the screen split horizontally and vertically, and allows transferring of text to files for temporary storage. The package may be site-licensed for organisations with large numbers of PCs.

Printworks.

PC Extras, (02) 319 2155
Price: \$134 (dot matrix); \$239 (laser)
Printworks is a menu-driven package for the majority of dot matrix or laser printers and IBM

or compatible computers. Features include: easy print mode selection, pivot printing to print sideways, custom character and font creation, numerous font sets, and a quiet mode to reduce printer noise. There is also a typewriter mode to print each character as it is typed at the keyboard.

Stock Executive

Arcam Pacific, (07) 52 9522
Price: \$249 (demo disk \$10)
A locally developed stock portfolio management system, this program encourages investors to follow sound investment practice, such as setting 'target' and 'stop loss' limits on each share. It has features such as on-screen action lists and an audible alarm when prices fall outside the limits; it also produces stock trading history and tax return reports. The package will be updated as Australian tax laws change. It runs on the IBM PC and many compatibles, and requires at least 128 Kbytes.

Touch

SCA, (03) 699 7255 or
(02) 211 4099

Price: \$85
Locally developed for the IBM and compatible range, this self-paced keyboard skills course is suitable for classroom or individual use. It shows a picture of the keyboard and highlights the keys as they are pressed. A warning buzzer indicates wrong keystrokes. It has a graded series of exercises with the ability to store statistics of progress, check for speed and accuracy during exercises and print reports of progress. The time for each lesson is controlled by the user.

Travelling Sidekick.

PC Extras, (02) 319 2155
Price: \$125

Travelling Sidekick is an extension of the Sidekick program and consists of a diary-type binder

NEW PRODUCTS

and software to update what the diary contains. A report generator prints information from Travelling Sidekick or data from ordinary Sidekick. Sections of the binder/program include: address book, phone directory, miscellaneous section, reference section, finance section, calendar section, pending section and storage pockets for credit cards, calculator and so on.

Turbo Frameworks

PC Extras, (02) 319 2155

Price: \$115

Ever wondered how your games actually work? This package from Borland contains Chess, Bridge and Go-Moku. The games come complete with source code and details on how the user may customise them. The chess program provides hints for making your next move, how to allow swapping of sides with the computer, and offers a set-up mode and a single-step mode for on-screen analysis. Go-Moku is an ancient Japanese strategy game for two players, and the Bridge game allows two players, or one human against up to three computer-controlled hands; it even allows cheating and if instructed will look at the other players' hands. All hands are displayed on the screen. I suspect there would be many useful programming techniques in the source code.

Zanysoft

Slimy Sam's Software, (007) 776 3216

Price: \$10,000

This product consists of 12 empty disks and a patent-leather

binder. Used in conjunction with the optional Letraset package it emulates the appearance of any expensive software while on the shelf. It has been developed in Australia particularly for Government bodies which have not yet spent their allocated funds. Not recommended for applications where the boss knows anything about software. After the department has paid, private refunds of up to 50 per cent may be negotiated with Sam.

Furniture

Adjustable Worktable

Nixdorf, (02) 439 5477

Price: \$1220

Still sitting on an apple box in front of a card table? Nixdorf has studied your needs and designed an adjustable worktable which meets the stringent ergonomic requirements needed for repetitive computer work. Height-adjustable, tilt-adjustable and expandable with easy manual or motorised adjustments, the desk comes in light-grey or natural colours, and has anti-glare surfaces.

Adjustable Document Stand

Nixdorf, (02) 439 5447

Price: \$71.50

This new document stand is adjustable from 15 to 75 degrees, to allow for the viewing angle of every operator. It has a line ruler for easy reading and a heavy base to prevent slipping. Nixdorf found that a user's field of vision is around 180 degrees, but the area of sharp vision is only a few

Source code for
Zanysoft.

degrees. By placing the document in exactly the right place, the incidence of backache, neck pains and muscular aches is diminished.

expanded to 640 Kbytes, with one 360 Kbyte drive and a 10 Mbyte fixed disk drive, and has two available expansion slots.

New Machines

Compaq Portable II

CCA Systems, (02) 660 0077

Price: \$6073

The new Compaq Portable II is described as the world's smallest and lightest portable computer (but what they really mean is transportable). With its built-in 23 cm green screen it weighs only 10.7 kg. Running MS-DOS with an 80286 CPU at 8 MHz, it is claimed to be capable of operating most popular business software three to five times faster than the IBM PC. It can be ex-

Eclipse ECS 286

Eclipse Computer Systems, (03) 813 3447

Price: \$7685

The Australian-developed ECS 286, billed as the fastest micro-computer in the world, is claimed to run at 10 times the speed of the IBM XT and three times faster than the AT — at half the AT's price. The ECS is built around the 10 MHz 80286, and features dual-ported memory with no-wait-state operation, both claimed as world firsts. An Ethernet-standard LAN is available, using MS-NET software. Standard memory is 720 Kbytes, with dual-mode drives for compatibility with the IBM PC or AT. Optional 30 and 80 Mbyte hard disks are available.

The

The logo for Creative Computer Company features the word "Creative" in a stylized, blocky font made of horizontal bars of varying lengths. Below it, the words "Computer Company" are written in a smaller, standard font.

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NEW PRODUCTS

Osborne 2000/PC College

Osborne Australia, (02) 290 1122

Price: \$2300

A new 16-bit machine from Osborne, with 640 Kbytes of memory as standard, plus a battery-backed clock/calendar, RAM-disk and print spooler. The PC College version is earmarked for the education market and designed to sell for \$1625 (single unit, tax-free).

tosh. Loading Macpaint from an ordinary disk takes about 23 seconds — it happens in less than four seconds from DASCH. A printer-bypass mode allows DASCH to share the Mac's printer port. Interfacing through the modem port allows RAMdisk capability for network systems. Independent from main memory, a system crash won't delete memory in DASCH. Units may be chained to provide up to 32 Mbytes.

Modem 123 offers variable-speed operation up to 1200 bps and a high degree of automation, suitable for users of bulletin boards, Viatel and commercial databases. The In-Modem 1234 (\$1550) is described as the ultimate in versatility for speeds up to 2400 bps.

IT-3 Accelerator

Interface Technology (02) 816 2700

Price: \$198

The IT-3 Accelerator is a plug-in board for the IBM AT, which is claimed to increase processing speed by a third. Actual time saved depends on the amount of I/O, but average savings are in the order of 25 per cent. Pick-up, installation and testing are included in the price, and the job can be done overnight to minimise downtime.

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Hyper-256

Hypertec, (02) 81 5464

Price: \$195

A 256 Kbyte memory board at reasonable cost — Australian-designed and manufactured, it is a straight plug-in compatible with the IBM PC and XT. The additional memory allows utilisation of the full potential of spreadsheets, databases or other memory-heavy software.

In-Modem Range

Netcomm Australia, (02) 888 5533

Price: Various

Netcomm has released a range of modems on plug-in boards for the IBM PC and compatibles. The In-Modem (\$599) has auto-dial, auto-answer and auto-disconnect, and 300 baud and 1200/75 operation. The In-Modem 1200 (\$680) offers fully automatic operation and is designed to improve performance over low-quality connections. The In-Modem 2400 (\$1160) is designed for variable-speed operation over the switched network at up to 2400 bps. At \$1250 the In-

Macbridge

Austor Micro Systems, (02) 922 2022

Price: \$1295

Consisting of several pieces of software and hardware, PC Macbridge is a low-cost local area network which enables dissimilar PCs to share files and peripherals. The expansion card has a Zilog 8530 communications chip and connects directly to the Appletalk personal network cable. The card is half-length and fits almost any expansion slot in the IBM and most workalikes. Laserscript software converts certain files to the Postscript typesetting description language.

Micro Mains Filter

Felstorn, (02) 922 6833

Price: Single \$69.95; four-outlet

\$89.95

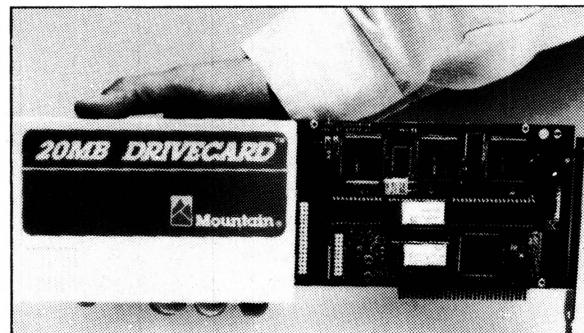
A reasonably priced mains filter for 240 volt lines, which prevents damage to equipment or loss of data. Mains power varies throughout Australia, with surges sufficient to disrupt computing equipment. The filter responds within as little as one to two nanoseconds and ensures a smooth 240 VAC. Maximum loading is 2400 watts (10 amps).

Mountain Drivecard

Logo Computers, (02) 819 6811

Price: \$2365

A 20 Mbyte hard disk on a card, this device plugs into an IBM PC or compatible. It has a power consumption of only 14 watts and weighs only 1.04 kg. It is supplied with a complete set of util-



ity programs, including software to divide the hard disk into multiple logical drives.

Racecard-286

O'Reilly Computer, (02) 692 8688

Price: \$1450

Don't throw away your old PC to buy a new AT. The Racecard-286 replaces the old 8088 with a new 80286, speeding up virtually all PC software by up to six times. The advantages of upgrading an existing machine instead of replacing it include continued use of familiar software, and no possible lease penalty on a machine with time to run on existing financial commitments.

Peripherals and Extensions

CPU Upgrade

CPU +, (02) 411 6122

Price: \$600

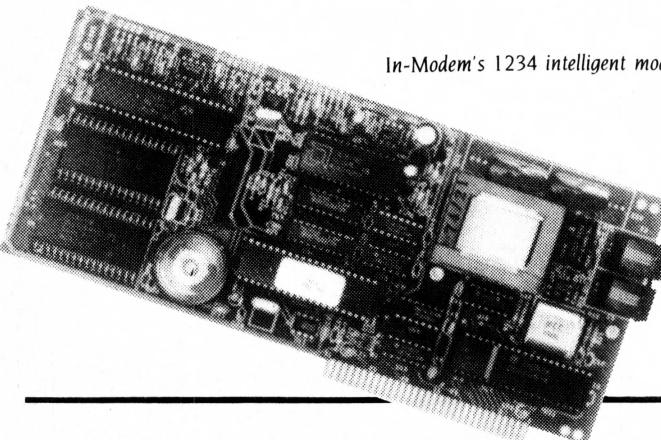
The CPU + upgrade kit allows the PC to perform 35 per cent faster while retaining full compatibility. It may form part of a total upgrade offered by CPU +, which can also include 2 Mbytes of memory, eight serial ports, a 60 Mbyte cartridge tape and an 86 Mbyte disk, for a recommended retail price of \$22,000. This is about half the price of a similarly configured NCR Tower, ICL Clan or AT&T 3B2.

DASCH

Austor Micro Systems, (02) 922 2022

Price: \$1995

The Disk Acceleration/Storage Control Hardware is an advanced RAMdisk system for the Macin-



In-Modem's 1234 intelligent modem

NEW PRODUCTS

SAR-10 'Voice Plus'

NEC Information Systems

Price: Around \$1300

Now you can shout at your PC. NEC's speech recognition and audio-response board eliminates typing repetitive words. With a vocabulary of 250 words and a recognition rate of 98 per cent, the system digitises individual users' voice patterns and only responds to authorised users. It also verifies commands, prompts the user and warns of errors by replying in a synthesised version of the user's voice. It is claimed to reduce the incidence of RSI by cutting down on keystrokes. What if you get a cold?

Silver Reed EXP 800

Silver Reed Australia, (02) 452 2022

Price: \$1895

A new daisywheel printer capable of 40 cps, with 10-, 12- or 15-pitch and proportional spacing as standard. Three interface boards are fitted — parallel, serial or IEEE-488. It has a choice of 16 languages and page lengths, auto-linefeed, and adjustable print hammer pressure. A 3000-character buffer which can be extended to 40,000 characters means your computer is not tied up during printing. A sheet feeder is optional.

SLE Board

Natick Management, (02) 428 1666

Price: \$550

An add-on board for the NEC APC III personal computer, which allows the NEC to run practically all IBM industry-standard software. Software runs faster and with better resolution, and there's the bonus of more memory, a clock/calendar, a parallel port and a spot for an 8087 maths co-processor. The price is a limited introductory offer. SLE stands for Software Library Extender.

The Grasshopper

Tallgrass Technology, (02) 211 2144

Price: \$2040

The Grasshopper is an internal tape storage system designed as a companion to 9 cm fixed disk drives. It takes the same space as a half-height floppy drive and is controlled by a small full-length card which can interface with up to two disk drives. The Grasshopper can store up to 20 Mbytes in 9 cm format. It offers disk-like functions with tape overwrite facility (without prior erasure) and file back-up and restore functions.

Services

Dutch Database

Paul Budde Communications, (02) 411 4666

Price: Free to Viatel subscribers
A new Viatel service aimed at the 250,000 people of Dutch descent in Australia, the Dutch Database will provide business information, news in Dutch, details of Dutch products and services, tourism and travel, government information and economic and financial data. Information on the Dutch general election in May '86 will be available and Dutch citizens living here may be able to cast their vote from Australia by the time the 1990 election rolls around. If you didn't turn off your echo, would you get Double Dutch?

Miscellaneous

The Edutel Book

Australian Caption Centre (02) 212 5277

Price: \$10

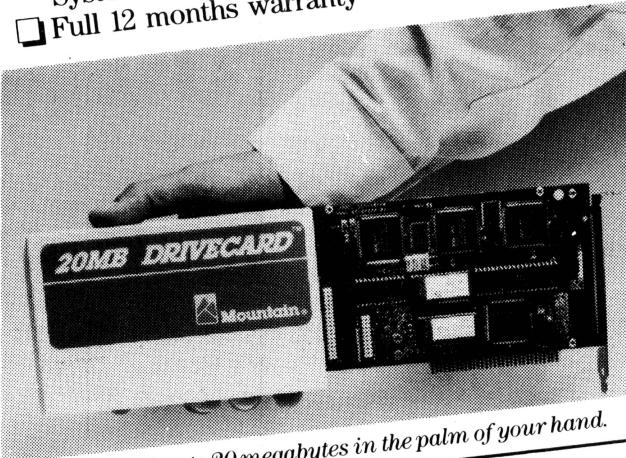
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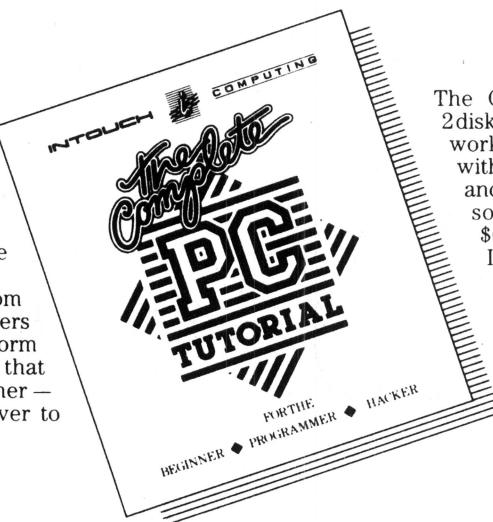
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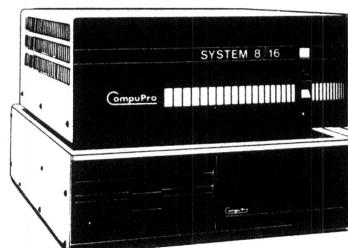
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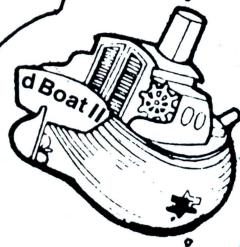
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EXPERT SYSTEMS

TWO IMPORTANT features to look for in expert system shells are the ability to cope with uncertainty and the ability to do at least some computational work. After all, there are very few real-life experts who are completely certain about every aspect of their knowledge, and most fields of expert knowledge have been studied sufficiently to be partly expressed in mathematical equations, which require computational capability. In knowledge-based systems this is known as 'deep' knowledge.

A reasonably priced package with both these capabilities has been developed for the IBM PC by Dustin Huntington of EXSYS Incorporated. Before purchasing this package you can get a good idea of how it works by buying the demo version for little more than the cost of the disks.

The EXSYS Package

This expert system development package isn't to be confused with the EXsys system developed by Adata Software in New Zealand for Data General, and sold in Australia by Andasexsys. The latter system runs on the Data General range of MV minis and is an applications software development system incorporating some expert system features and methods. It costs thousands of dollars and is aimed at the corporate DP market.

I'm talking about the expert system development software from EXSYS in Albuquerque, New Mexico, which runs on 256 Kbyte IBM PCs and compatibles, costs \$US300 and is aimed at the individual user.

EXSYS is written in C and comes on three 13 cm floppy disks, which also include sample expert systems and a valuable tutorial program. The disks are not copy protected, so you can make back-ups, and you don't have to worry about losing your valuable software. In addition, a two-disk demo version is available from the supplier for \$US10, which you can deduct from the purchase price of the full system if you subsequently decide to buy it.

Because it may be inconvenient to order your demo disks from the United States, and since no formal distributor has been set up in Australia, I've arranged to make some copies of the demo disks, which I'd be happy to send to you for \$15. More about this later.

The copyright owner gives any user permission to copy the demo disks freely and make them available to others, so they too can evaluate the software before they buy.

Let's hope that with all this good faith on the part of the supplier piracy of the full system is kept to a minimum.

The full system consists of four programs. The first is EXSYS.EXE, which runs the expert system once it has been developed. EXSYS.EXE is on both the main system disk and one of the demo disks. Although copyright of the program is held by author Dustin Huntington, buyers are automatically licensed to distribute unlimited copies with either the sample expert systems provided on the demo disks or with his or her own knowledge base. So if you have some knowledge for which you think there is a market and you have access to an IBM PC, here's your chance to enter the exciting new area of knowledge-based software development and marketing.

Expert systems may be thought of as a new publishing medium, which may have as strong an impact as the printing press. Expert systems allow knowledge to be made available to computer literates, just as printed books make knowledge available to large numbers of people who can read.

However, don't think translating knowledge from your head into a set of rules and computations is easy; you should allow months to put something useful together, and probably a year or two to develop a major knowledge base.

The second main program in the EXSYS package is EDITXS.EXE, which only comes as part of the main system and may not be copied for any purpose other than personal back-up. EDITXS.EXE enables you to create and edit the rules, equations and text which make up your knowledge base. It creates two files: one holds all the text used in the knowledge base and has the extension .TXT, while the other contains the logic of the rules and has the extension .RUL.

To run an expert system the .RUL file must fit in memory with EXSYS.EXE. This limits the number of rules to about 700 for a 256 Kbyte system. If memory is available the .TXT file can also be loaded, which results in faster execution than if it remains on disk. EDITXS.EXE also allows test running of the rules as you develop them, to check your logic for gaps or conflicts.

The next program is SHRINK.EXE. It's only run once at the end of the development of an expert system to compress the text file to a minimum; it simply removes the wasted space and text strings discarded during the editing process.

The last program, also run only once, is FASTER.EXE. It further optimises the running of the expert system by rearranging the rules into an optimum sequence for speed of operation. For large systems with many rules (<1000) the effect can be a ten- to twentyfold increase in speed.

There is a number of ancillary help files to provide on-line help when using the programs. Pressing 'H' usually results in an appropriate help screen being displayed.

There is also a small manual of about 90 pages, which you should read after running some of the sample expert systems, and the tutorial on writing your own expert system. Unfortunately the manual doesn't have an index, but it does have an extensive contents table, and with the on-line help features you won't need to refer to it much after the first reading.

Definitions

Since every expert system shell seems to use different terminology, it's useful to state some of the definitions used in the EXSYS manual before we discuss EXSYS in more detail.

The rules in EXSYS are of the form shown in Figure 1. The 'if' part of the rule contains one or more *conditions*. There are two types of conditions: text and mathematical. Text conditions are made up of a qualifier and one or more text values. An example of a qualifier is: 'The colour of the coin is' and the possible values are: yellow-gold, silver and bronze. A qualifier can have up to 30 values. If you want to use more values you must split them into two groups and create a new qualifier which distinguishes between the two groups.

The 'then' part of the rule may contain one or more conditions and/or one or more choices. The choices are all the possible final solutions or conclusions of the expert system. In the case of a system to identify current Australian coins (see *Your Computer*, September 1985) the choices are the current Australian coins.

A rule may only have conditions in the premise (the if part of the rule) and it can have both choices and conditions in the conclusion (the then part of the rule). Up to 126 conditions can be used in the if part of a rule and up to 126 conditions plus choices in the then part. The use of conditions in the conclusion means we can draw conclusions about some intermediate result, which can then be used as a premise in other rules. This allows the overall problem to be split into a number

General Form	Example
IF	IF
Condition 1 and Condition 2 and Condition 3	the colour of the coin is bronze and the number on the coin is 1 and the coin is a current Australian coin
.	.
THEN	THEN
Condition n and Condition n+1 and Choice 1 and Choice 2	the coin is a 1 cent coin.
.	.

Figure 1. The form of rules in EXSYS.

of smaller problems which are easier to handle. For example, in a complete coin identification system we might first determine the country of origin as an intermediate result and then identify the particular coin.

Each rule also has a note and a reference associated with it. The note is simply a text explanation of some aspect of the rule and the reference allows you to refer to the source of authority for the rule in case the user wants to look it up further. The use of notes and references gives EXSYS great educational potential.

Features

EXSYS makes good use of colour if you have a colour monitor. If not, you can select the NOCOLOR option, which ensures good-quality monochrome display.

The special features of EXSYS include the fact that it can perform normal computations as well as run the logical 'if-then' rules. Many real-life applications of knowledge are a combination of simple rules of thumb based on experience, and typically expressed in 'if-then' logic together with an amount or formula or computational knowledge based on physical models of the process or equipment concerned.

Available mathematical operations include +, -, *, /, %(modulus), SIN, COS, TAN, ASIN, ACOS, ATAN, EXP, LOG, ABS, SQRT and INT. The only operation missing

is ' \uparrow ', but the same results can be achieved in a somewhat inefficient way by using EXP and LOG. The limits on mathematical expressions are you can't have more than 20 sets of parentheses or more than 99 total characters. I think most computational requirements will be within these bounds. Precision calculations seem to run to about seven digits, and if the 8087 co-processor is available on your machine EXSYS will use it, so even complex computations run quite quickly.

You can of course define a range of variables to be used in these calculations. Variables such as [COST OF SYSTEM] are shown in square brackets and can be quite meaningful. Variable names can be up to 100 characters long, but only the first 18 are significant. Each variable can have additional text associated with it to explain its meaning clearly. Figure 2 shows an example of a rule containing simple calculations involving several variables.

Probabilities

The other important feature of EXSYS is that it's designed to work with uncertain conclusions. In this respect the coin identification case isn't a good example. A medical diagnosis example might be more appropriate. The uncertainty of a conclusion is determined by associating a numerical probability value with each conclusion reached by a rule. These probability values can be handled in three differ-

ent ways in EXSYS, and one of these has a further three options. The three methods are as follows:

- Choices are given a value of 1 or 0, which is equivalent to 'yes/no' or 'true/false', so there is no uncertainty.
- Choices are given a value of 0 to 10. Values of 0/10 and 10/10 are equivalent to 'absolutely no' and 'definitely yes' and lock these values. Values of 1/10 to 9/10 represent increasing levels of certainty and are averaged over all the rules which contribute to a given choice.
- Choices are given a value of 0 to 100. In this case 0/100 and 100/100 don't lock the final value but are treated in the same way as all intermediate values. There are then three ways in which the 0-100 system can be made to behave: simple average, dependent probabilities and independent probabilities. These simply control the way in which the probabilities derived from individual rules are combined to derive the probability of the final conclusion.

With so many ways of handling uncertainty most real-life situations can be simulated.

Calling External Programs

External programs can be called from within EXSYS, to get data and make more complex calculations, and the results can then be passed back to EXSYS for expert analysis. EXSYS expert systems can therefore receive data directly from automatic

EXPERT SYSTEMS

testing equipment, process sensors, databases, or some spreadsheets such as Lotus 1-2-3. EXSYS can call an external program to produce a graphical display of information. However, there must be enough memory available for both EXSYS and the external program to run.

There are two methods by which external programs can be called. The simplest way is used when only a single variable value is required. All you have to do to call the external program which is to supply this value is put the command RUN(program) followed by the normal explanation text for the variable in the text associated with that variable. For example, if (program) was (BASIC AVERAGE) then a BASIC program named AVERAGE.BAS would be called whenever the value for that variable was required. The program AVERAGE.BAS must write the result to a file called RETURN.DAT, where EXSYS will automatically look for the result. Any

number of external programs returning a single variable can be run.

Only one program returning multiple variables can be run and it's best run at the start of the knowledge base. In the case of multiple variables, each variable returned to the knowledge base must be on a new line and must be identified by giving the variable number followed by its value.

EXSYS Demo System

The EXSYS demo system consists of two floppy disks containing the full EXSYS runtime system and five sample expert systems. The expert systems are designed to demonstrate the range of ways in which EXSYS can be used, and include both simple and complex rules. An example of a complex rule taken from the sprinkler expert system is given in Figure 2, which illustrates the use of probability and calculations within the rule.

One of the demo disks also has an early version of the manual on it, which you can print out. The other disk has a tutorial which takes you step-by-step through the development of a simple expert system. The tutorial takes about an hour and only requires you to press the space bar to signify you've read the explanation at each step and are ready to go on.

As I indicated earlier, the demo disks are available from EXSYS for \$US10. I can make you a copy of mine for \$15; send cheques to 59 Italia Road, Seaham 2324. You're encouraged to make further copies and pass them on to your friends or club members.

The demo system is menu driven and when you're satisfied that it meets your requirements you may select a final option which prints out an order for the full system. If you're at all interested in expert system development you'll find it well worth your while. □

```
RULE NUMBER: 3
IF:
  (1)  [LENGTH]*[WIDTH] <= 2500
THEN:
  and HOME SPRINKLER SYSTEM PACKAGE - Probability=10/10
  and LARGE SPRINKLER SYSTEM PACKAGE - Probability=0/10
  and INDUSTRIAL SPRINKLER SYSTEM PACKAGE - Probability=0/10
  and [HOME SPRINKLER HEAD] IS GIVEN THE VALUE (INT([LENGTH]/15)
  +1) * (INT([WIDTH]/15)+1)
  and [COST] IS GIVEN THE VALUE [COST] + ([HOME SPRINKLER HEAD]
  * 27.95
  and [PIPE] IS GIVEN THE VALUE ((INT([LENGTH]/15)+1) * [WIDTH]
  ) + [LENGTH]
  and [COST] IS GIVEN THE VALUE [COST] + ([PIPE]*.75)
```

Figure 2. Example of an EXSYS rule taken from the sprinkler expert system.

TIME PASSES, and three years after its release the 'standard' Beeb we all know and love has altered quite a bit. Acorn has released a series of attempts to defend the Beeb against its greatest weakness (a distinct shortage of RAM), while waiting for a fully redesigned successor to emerge from the development process.

Well, it's happened. The standard Beeb is now to be the Master 128, essentially the current B++ with lots of added goodies, including a numeric keypad, 50 bytes of battery-backed memory (for saving start-up configurations), BASIC 4, View, Viewsheet, internal expansion slots for extra processors and a software-switchable 8271 or 1770 disk interface.

Don't be fooled by the 128 label: usable RAM is still limited to around 26 Kbytes in all screen modes. The new operating system includes a full implementation of the graphics facilities found in the current Graphics Extension ROM.

Upgrading will be much cheaper, thanks to the presence of the internal expansion slots. The 65C102 co-processor board adds 18 Kbytes to the usable RAM and reduces processing times greatly. The Master series is 50 per cent faster than the existing model, which is still one of the fastest micros around. The 65C102 board will run the PCW benchmarks an average of 50 per cent faster than an IBM AT, or three times faster than the old Beeb.

Next up the line is the Master 512 Kbyte machine, which uses an 80186 for MS-DOS compatibility. Megalomaniacs will be attracted to the Master Scientific, which with 512 Kbytes of RAM and a 32016 central processing unit should satisfy the most refined tastes. (But a nagging doubt remains: will it run Elite?)

Prices start at \$1195 for a Master 128, which includes all the internal software (word processor, spreadsheet and so on), and interfaces for serial and parallel printers, an A/D converter, disks and so on. It doesn't include disk drives, which come in all sizes and degrees of floppiness.

Next month, if I survive, I'll report on a hands-on, real-time, no-holds-barred, full-frontal encounter with a 128.

Of Mice And Them ...

During the past few weeks I've been doing a lot of artwork for two versions of the same package: one for the BBC, using the AMX mouse, and the other for the Apple, with the Apple mouse and Mousepaint. It's been a frustrating task, given the very real limitations of the software which accompanies both these rodents, but it has highlighted some of the strengths and

weaknesses of each version and given me an opportunity to compare them by performing identical tasks.

At the outset, let me admit that I consider something like ICL's Perq or a fully-optioned IBM AT as a minimum package for serious work of this kind, but the job I was doing required the finished product to appear on Beefs and Apples, so it was out with the AMX.

The AMX doesn't seem to have the mechanical accuracy of the Apple mouse, perhaps because it uses a highly polished ball instead of the Apple's coated one. Moving the mouse and watching the pointer stay in the same place became more and more frustrating, and it didn't seem to matter what sort of surface I used. Perhaps a larger ball would help, though I suspect the coating makes the difference.

The software for each mouse differs greatly. The AMX software uses three packages to do slightly more than can be done with Mousepaint on the Apple. You draw the outlines using AMX Art, touch up the rough corners with AMX Utilities, and apply the final coat of colour with AMX Paintpot. Not having the 'zoom' facilities on the Art disk is tiresome, but not having a usable cut-and-paste facility is unforgivable. (Yes, there is such a facility, but its speed makes me suspect it's written in code originally destined for a hand-cranked calculator.)

For ease of drawing, the AMX software leaves Mousepaint far behind. I'd wrongly thought the three buttons would cause complications, but the simplicity of the line and circle drawing facilities almost makes up for the lack of an equivalent to the Mousepaint 'undo' option. The Hand is one of Mousepaint's horrors, and I always feel like smacking it for clumsiness while endlessly dragging the screen back and forth. The clumsiness has been avoided by reducing the size of the AMX screen, making the design of layouts much easier. The colouring routines in Paintpot are accurate and versatile, and although the variety of colours available won't be enough to cope with a project like the roof of the Sistine Chapel, they should handle 'Blue Poles' with ease.

With both sets of pictures taking about the same time to produce, the final test had to be a comparison of the finished products. The higher resolution of the BBC screen was offset by the smaller picture produced with the AMX software. 'Super Art' promises to be the answer, with everything in one package, but I haven't yet had a chance to use it enough to make a fair comparison. □

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Your MICROBEE

BY COLIN TRINGHAM

THERE'S a mountain of user group information to plough through, so I'll just tell you about the items which catch my eye. If you have any problems why not join your closest user group and really make your Microbee buzz?

I've always been annoyed by the fact that if you use the Microbee monitor on a 64 Kbyte disk system and go back to BASIC with the usual command 'G8021', all the disk operations are suspended and you have to cold boot the system to regain disk control. The same problem occurs with the CIAB. Two methods of dealing with this problem are suggested in the Western Australian Group's October newsletter. 'G8001' re-engages the disk system, while 'G801E' leaves your monitor copy on the screen so you can re-enter any information into your program. If you want to re-enter CP/M, type 'G0' (that's a zero, not a letter 'O') and the system will cold boot.

I learned from the Sydney User Group's newsletter that the uninstalled version of Wordstar supplied with the Microbee treats the screen as a simple serial terminal, which results in slow updating to the screen. If you want to reinstall Wordstar to make the best use of your printer or page layout requirements, use the installed version: it's configured for a memory-mapped display. More details on customising Wordstar will be found in the October issue of *Beeline*.

Talking of *Beeline* reminds me of Applied Technology's (or should I say Microbee Systems') much publicised bulletin board, which was also to be called *The Beeline*, but has been abandoned in favour of supporting Viatel.

SMUG As A Bug?

However, Microbee owners on the east coast may well be interested in the latest bulletin board catering for Microbee owners. The board's name is SMUG-BEE BBS, and is being run by SMUG editor, Bob Fryer, with support from the Sydney Microbee Users' Group. The number to call is (02) 607 7584. Bob is hoping to get much of his material for each issue of *The Beeline* via the new BBS.

A new name to note for Microbee programs is 'Wasp-Soft', which operates from PO Box 268, Mortdale 2223. You can contact the Manager, Andrew, on (02) 523 8550 between 7.30 and 9 pm. This company can supply Mytek and Dreamcards programs, and has just introduced three new programs of its own. The first of these is the excellent 'Golf' game, which Harry Purvis has been developing to teach

SMUG members the mysteries of Assembly language programming. I've seen this program in operation, and advise anyone who has doubts about the limitations of the Microbee's PCG characters to see what a little thought, combined with some first-class Assembly programming, can do.

The second program, 'Droids', is a good arcade game, which features excellent graphics and sound and has 12 different screens. I hope we'll see more programs of this standard.

The third program, 'S-Command', is an arcade game for two players of the shoot-em-up-before-the-other-player-gets-you variety.

The 9 cm disks cost \$25; 13 cm versions are \$22. Wasp-Soft intends to release more new programs soon, and Andrew would like to hear from interested programmers.

Pirates Ahoy

I heard a disappointing story when talking to a Melbourne supplier of Microbee programs. It seems a young Beekeeper went to the shop to see the latest programs. On looking at the most recent offering, he loudly boasted to the owner that he had already broken all the protection codes of the programs on offer. He seemed annoyed there were no new 'challenges' to his pirating skills. No wonder there are so few new games programs on the market!

During November I visited a Microbee Computer Expo at the Denistone East Public School, and was amazed at the number of new, quality educational programs available. I can't mention all the companies involved, but Goodison Software, J & H Beesware and the Caresoft groups immediately spring to mind.

Goodison's latest efforts include a program with integrated hardware called 'Top of The Class', which is modelled on a well-known TV quiz show, and comes complete with buzzers for the contestants. Three files of questions are supplied with the program, and extras can easily be prepared. The graphics, especially the large typeface on the monitor, are very good. Goodison's other top-sellers, 'The Great Australian Car Rally', 'Shipwreck Island' and 'The Yacht Race', are good demonstrations of the Microbee's ability to educate and entertain.

J & H Beesware displayed more educational programs, and I was most impressed with the new offerings.

The Caresoft team introduced two new programs, 'Cherry Maths' and 'Leapfrog', which feature great graphics for younger pupils learning to use the 'Early Word' word processor.

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Apple //	52k**	55k	30K
User Definable keys	YES	NO	YES
Word Search:			
Bounded	YES	NO	NO
Bi-directional	YES	NO	NO
Wildcard	YES	NO	NO
Form Letters	YES	NO	YES
Label Printing	YES	NO	NO
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Mail	YES	NO	YES
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Sort	YES	NO	YES***
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Multi-column text	YES	NO	NO
Printing:			
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MANY MOONS AGO, in the June 1985 issue of *Your Computer*, I ventured into the use of Debug as a simple assembler, partly to show some of the tricks of using Debug and partly to show a problem some utility programs that come with DOS can have when co-resident programs are installed.

Briefly, the gist of the problem was that Format, Diskcopy and Debug could give error messages or operate in quite unexpected manners if co-resident programs were installed.

Following publication of the column, Nick Hammond of FBN Software (of PC-Alien, Smartkey and Smartpath fame) shared with me the results of some investigations he carried out. Essentially the problem revolves around the DMA (direct memory access) chip selected by IBM. It can only address memory in 64 Kbyte pages which always start and finish at fixed memory addresses (64 Kbytes, 128 Kbytes, 192 Kbytes and so on).

Data which crosses the physical page boundary can't be transferred in a single operation: data up to the page boundary must be transferred, the page register changed, and the rest of the data transferred. Use of INT 13H (a BIOS interrupt) to transfer data which crosses this physical page boundary will return a BIOS error. Programs which don't check for the address of the page boundary and allocate a data area clear of it (like Format) will fail intermittently, depending on where they are loaded in memory.

I find it amazing that the programs with which I have had problems are Format, Debug and Diskcopy — all utilities included as part of DOS. If software by independent authors failed for the reasons above it would be bad enough; when software written by the authors of the operating system has these failings it is unforgivable. Still, forewarned is forearmed, and the solution is to boot up without co-resident software (and sometimes without proprietary device drivers active) before using Format, Diskcopy or Debug.

Some More Debug Tricks.

Debug has a built-in assembler. Typing in an assembler program one line at a time (and having it assemble a line at a time) is easy, but if an error is made the whole thing has to be retyped. Sure, you could do an Unassemble with the built-in Debug

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command, but insertion of additional lines and so on is very frustrating. How would you like to be able to create an ASCII source file complete with comments, assemble it, test it, and make alterations if required?

Use your word processor in non-document mode or EDLIN, or even the command COPY CON GET-DAY.DAT, to enter the following lines into a file called GETDAY.DAT. Each time <enter> is shown in the listing, press the Enter key.

```
a 100 <enter>
mov AH,2a ;select DOS function hex 2A <enter>
int 21 ;execute function in AH register <enter>
mov DL,AL ;move byte in AL to DL <enter>
add DL,30 ;add 30 hex to byte in DL <enter>
mov AH,2 ;select DOS function hex 2 <enter>
int 21 ;execute function in AH register <enter>
int 20 ;finish program <enter>
<enter>
rcx <enter>
f <enter>
nGETDAY.COM <enter>
w <enter>
q <enter>
```

Now, assuming no co-resident software is active, the default drive is the A drive,

and DEBUG.COM and GETDAY.DAT are both in the A drive; type:

A> DEBUG <GETDAY.DAT

Debug will load and ignore the keyboard, getting its input from the file GETDAY.DAT. Line by line it will work its way through the GETDAY.DAT file, and create a program called GETDAY.COM. Notice two things:

1. Debug is reading from a source code file called GETDAY.DAT.

2. Comments starting with a semi-colon (;) can be used within the assembler code, but not in the Debug instructions.

GETDAY.COM displays the day of the week as a number — 0 for Sunday, 1 for Monday and so on. It uses function hex 2A under DOS interrupt hex 21 — the GET DATE function. This accesses the system clock and returns the year, month, day in the month and the day of the week, though GETDAY.COM only uses the day of week. The DOS Technical Reference manuals all correctly indicate that the year, month and day in the month all are accessed with function hex 2A, but some (incorrectly) suggest the day of the week is returned by the GET TIME function.

Let's look at GETDAY.DAT, line by line, to see how it works.

a 100: Tells Debug to start assembly at offset 100 hex.

mov AH,1: Loads a hex 2A into the AH register to select the GET DATE function.

int 21: Executes function 2A.

mov DL,AL: The day of the week is in register AL. Mov it to register DL ready to print it to the screen.

add DL,30: In the DL register is a number from 0 to 6 (for Sunday to Saturday). To print out a zero to six character, hex 30 must be added to give the ASCII value.

mov AH,2: Load a hex 2 into the AH register to select to print a character-to-screen routine. This prints the character whose ASCII value is in the DL register.

int 21: Execute function 2.

int 20: Finish program, return to DOS.

<blank line>: Tells Debug all code has been entered — return to command mode.

rcx: Reads the cx register.

f: The file is 0F hex long. Input this to cx register.

nGETDAY.COM: Name the file GETDAY.COM.

w: Write the file to disk.

q: Quit debug, return to DOS. □

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ON THE WHOLE, the Bondwell is a reliable computer, despite a potentially weak power supply.

A compact, high-frequency switching-type power supply converts the 240 volt line into DC, then uses an oscillator to produce high-frequency, high-voltage AC, which is fed to a transformer. The low-voltage output of the transformer is then rectified and filtered in the usual manner. Output voltage control is achieved by using feedback from the low-voltage supply to alter the oscillator characteristics so just the right signal is fed to the transformer.

This approach is compact and efficient, but complicated. The supply is almost impossible to repair without detailed circuit information and a good knowledge of switching power supplies. In the event of failure the only reasonable option is to replace the supply.

There have been two types of failure to date, each with a similar symptom: there is simply no power at turn-on.

In the first case the power may suddenly appear some moments after switching on, or when the switch has been turned off and on again. The problem may occur only occasionally at first, and become more frequent, until the machine is too unreliable to use. Once started, the supply seems to run happily until switched off, and the problem may be more apparent when the machine is cold.

This type of failure occurs when the high-frequency oscillator doesn't start, and can be due to components varying slightly from specification. In some cases an experienced technician can quickly repair the supply, or make a small component change to increase reliability.

Blast Off

The other fault is much more obvious. At switch-on there is a small pop, the fuse blows and there may be a burning smell. Something inside the supply has exploded, and the only reasonable cure is to replace the whole unit.

Most repairers support an exchange arrangement for power supplies: if you return the faulty unit you get a discount on the replacement. The repairer is ahead if your supply simply has a blown fuse, but behind if it's a write-off. In either case, testing and possibly repairing exchanged supplies is a much more economical proposition than attempting to repair spe-

Most repairers support an exchange arrangement for power supplies: if you return the faulty unit you get a discount on the replacement. The repairer is ahead if your supply simply has a blown fuse, but behind if it's a write-off.

cific machines while customers anxiously await results.

If your repairer is agreeable, you may wish to remove and replace the supply yourself. In this case be certain about where you stand if the new supply doesn't work: your replacement will almost certainly be a previously exchanged unit, and it could have been inadequately tested. Alternatively, the fault may not be in the power supply!

Getting at the Power

Accessing the power supply isn't difficult. Remove the power cord and fuse, then the six screws around the faceplate and the five screws in the bottom. (You'll need a long-shaft Philips-head screwdriver for the bottom screws). The top panel can be lifted away to reveal the main circuit board and the disk drives. Unplug all leads from the main board; they're keyed, but take note of the keying mechanism so you don't try to force them back the wrong way later. Remove the screws from the main board and lift it away.

The power supply is in the metal box under the plastic shroud at the rear. Use a nut driver to remove the nuts from the mounting screws and slide the power supply case out, being careful not to nudge the small PCB on the neck of the picture tube.

There is a fuse in the power supply. I haven't yet had one of these fail, but you may wish to replace it and retest the system just in case. If this doesn't solve the problem you're in for an exchange.

There must have been problems with

the connector used for the power supply, since many Bondwells have two of the connector leads removed from the connector housing and soldered to the power supply pins. If this applies to your machine you will have to label the leads carefully and unsolder them. Otherwise, simply remove the connector. The power supply can then be unbolted from its case and delivered to your supplier. When collecting a replacement make sure you receive the same mounting hardware you delivered. The unit shouldn't usually have any hardware attached.

It's possible to reassemble the machine and run it without reinserting the supply, but it's not recommended. Without its frame the supply is extremely hazardous, both to you and to the circuitry on the main board; thousands of volts are present on some exposed components, as well as 240 volts at the exposed fuse mounting. Besides, it only takes a moment to reinsert the supply.

If your original supply had the two soldered connector pins you will probably have to bend out the pins of the new supply ready for soldering. When they're connected use a good-sized piece of heatshrink tubing to insulate them. The whole unit can be reassembled, the main board replaced and the lid screwed on. Don't try to replace the lid with the bottom screws in their slots — they must be removed completely.

Prevention is the best cure, and some attention to the care of the power supply will help it last. Never operate the machine with the back flap closed; it gets extremely hot. Too much heat in the logic board will create processing errors, while too much heat in the power supply will probably cause something to blow up. Velcro can be adhered to the back flap to prevent it accidentally closing if the machine is bumped or moved. If operating in a warm environment, keep the disk storage slot empty so more cool air moves through the machine.

You should also avoid switching the power supply on and off rapidly — allow a 10 second cooling period if you accidentally turn the power off. Also, operate the machine from its in-built main switch only; don't switch it off at the power point or simply unplug the cord. And finally, when switching on, give the switch a good solid shove to make sure it's really on. □

What's In A Number?

Most computer owners feel the need to hang some peripherals from their machine at some stage. Apart from the keyboard, the most common peripherals are datasette and monitor (and joystick!), but printers, disk drives and modems will vastly expand your computer's potential, allowing new ways to input and output information.

Peripherals, as their name implies, are satellites of the central computer 'brain', and are designed to respond to commands sent by their 'boss'. These commands are transmitted in electronic pulses, which are then decoded by the peripheral into 8-bit bytes. Since eight bits can be arranged in 256 different combinations, the central computer is able to send 256 different 'parcels' or characters.

In order to gain full control of a peripheral you need to be able to tell it what to do with the data you feed it. Since you don't want to confuse the commands with the data, the meanings you assign to each of the 256 parcels are very important. That's where the numbers come in.

The need for a standard code was recognised in the very early days of microcomputing. Wouldn't it be nice if all computers used the same numeric codes for communicating all data and control characters to the outside world? It would mean a printer manufacturer could make one printer which would work on all micros, and different makes of computers could still communicate via modem. The result was what we now call ASCII — American Standard Code for Information Interchange.

The only problem for the ASCII standard makers was that the entire alphanumeric and control codes fitted into less than half the 256 numeric codes available. They did what seemed sensible, allocating only the first 128 of the codes and leaving the remaining 128 for a future update.

Meanwhile, the micro revolution continued. Before the ASCII standard was fully established, manufacturers such as Commodore and Apple were exploring alternatives. Commodore decided on its own variation of ASCII; CBM ASCII uses the other 128 characters for graphic, colour and additional control characters. At the time this was a real innovation, but every manufacturer and his or her dog has since invented their own particular variations. As a result, no standard for the extra codes ever evolved (but we're still trying).

Commodore also deviated from the 128

The only problem for the ASCII standard makers was that the entire alphanumeric and control codes fitted into less than half the 256 numeric codes available. They did what seemed sensible, allocating only the first 128 of the codes and leaving the remaining 128 for a future update.

standard ASCII codes by reversing upper and lower case and fiddling about with the meanings of some of the 32 control codes. It was a decision we CBM users are still living with; while the rest of the world communicates with true ASCII, we have to have special conversion programs for telecomputing or talking to non-CBM peripherals.

This can be very frustrating. For example, I have a modem and *Your Computer* has a bulletin board, and even though I have the software to send this article direct to our BBS, it would arrive with the upper and lower case reversed. I would have to write a special CBM to ASCII file conversion program to overcome this — a project which somehow remains overlooked in the bottom drawer.

Still, CBM ASCII does have its benefits. It has colour codes as well as graphic characters — a feature exploited by the Sydney-based RCOM BBS (02) 667 1930. If you ever feel jaded by the same old monochrome text-based BBSs, you should check it out. I suppose with five million C64s in the world Commodore has a case for setting its very own standard.

Printer Interfaces

This ASCII business comes to the fore when choosing a printer. If you stick to CBM printers you can be sure they'll work without causing grief. The trouble is the CBM range is not as versatile as that available independently. I've yet to see an NLQ printer from Commodore. The company's best dot matrix is the MPS 802, which is

good, but not up to NLQ standard by any stretch of the imagination. Besides, it's hopeless at graphic screen dumps, unless you have a special machine code program to drive it, and even then the NL program might not work with graphic programs such as Paintpic or Koala Pad.

Commodore does supply the DPS 1101 daisywheel printer for around \$500, but while this provides true letter quality, the print speed is slow (typically 17 characters a second), and again the machine is quite useless for graphic screen dumps.

The Best Of Both Worlds

Independent printers will work on almost any computer. They use standard ASCII, and also respond to more control codes. Fortunately, printer manufacturers have more or less standardised the codes, so independents can produce a printer interface which will work with almost any printer. These nifty little gadgets solve all Commodore users' problems; some of them even enable you to change fonts, and have inbuilt buffers so your computer doesn't have to wait for the printer to do its stuff.

Judging from feedback from the members of one user group, Xetec interfaces are the preferred choice. They will interface to just about any printer, and provide heaps of extra features. The second choice seems to be the Cardco range.

A word of warning for C128 users: some interfaces have been known to cause a 'terminal' zap (no pun intended) when switching from 128 to 64 mode, so check before you buy.

Control Keys

One last word about ASCII — the codes from 0 to 31 have special functions, which are reserved as control codes in standard ASCII. In Commodore ASCII some of these codes appear to do nothing, while others are used for functions such as shifting the screen to lower case. On the other hand, codes such as CHR\$(13) for Return are identical in both standards. You can generate these codes by pressing the Control key, along with a character. The CTRL letters A to Z are codes 1 to 27 (for instance, CNTRL-M is also CHR\$(13)), but they're usually unprintable characters, so you don't see them on the screen unless in quote mode. You can, however, include tests for control characters in your programs, simply by using a GET statement to test for the control CHR\$() value you're after. □

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A LITTLE change this month from heavyweight programs like PC-File, to a few more file, disk and screen-management utilities. Four programs which many people find invaluable are Volser, Fdate, Move and Backscr.

Move

Imagine you have a hard disk which has been divided into several layers of subdirectories. One subdirectory has grown as files are added and the collection of files in the directory is no longer appropriate. The usual method of coping with this situation is to form a new subdirectory, copy some files to it one at a time (using the '?' and '*' wildcards if possible), then erase the duplicated files in the old subdirectory.

The average user is left hoping all the files to be erased were transferred successfully. The whole procedure is risky because a file will only be copied if there is free space available which exceeds the file size. The user has to be alert to the DOS 'Insufficient disk space' error message, especially if wildcard file transfer is used.

Move overcomes this problem rather neatly, transferring files from one subdirectory to another on the same disk *without copying!* DOS subdirectories are in the form of files, and Move reads the directory information for the files to be transferred from the source subdirectory and writes it to the target subdirectory. The actual files remain in their original places on the disk, completely unchanged.

Volser

When a disk is formatted, one option available to users of DOS 2.xx and 3.xx is to use the '/v' switch. If /v is specified DOS formats the disk, and before it asks if another disk is to be formatted it asks if a Volume Label is required. The user can enter a label of up to 11 characters, after which a DIR will give a listing of the files on the disk, and the label will be specified at the top of the listing. DOS 3.xx provides a utility program to change the volume label, but none is provided with DOS 2.xx.

Volser allows you to either create a new label or alter an old one, at any time. The syntax is

VOLSER d

How often have you been doing a DIR, LISTing a BASIC program, or downloading a message over a modem, when a critical line scrolls off the top of the screen, never to be seen again?

where 'd' is the letter of the drive containing the disk to be labelled. If no drive is specified Volser will attempt to change the label on the disk in the A drive. If the disk has a label, it's displayed and the new label (up to 11 characters) is typed in. If the original label is satisfactory, hitting '(enter)' will allow an exit to DOS. Use of labels is highly recommended — they identify the purpose of files on a disk quickly and easily.

Fdate

I'm sure all of you who, like me, don't have a clock calendar board *never* fail to set the date and time properly whenever you boot the system. Well, most of the time? Half the time?

DOS stamps files with the time and date, which can be a real help in determining which version of a file is the most recent. If the time and date are not specified at boot, either manually or with a clock-calendar chip, all files created in that session are stamped 1-1-80, with the time of creation being the time elapsed since boot.

Fdate changes the time and date in the directory listing of the selected files. The default new time and date are the values current in the machine at the time. Other values can be specified as Fdate is run. Now nobody has an excuse for files dated 1-1-80!

Wildcards

In their distributed form neither Fdate nor Volser supports wildcard filenames. The batch file REPEAT.BAT mentioned in

November's Your IBM will do the trick if suitably modified. If there are only a few files which need to be moved or have their time and date changed it's probably worth driving Fdate or Volser manually. If there are lots of files to be changed REPEAT.BAT is a boon.

Backscr

How often have you been doing a DIR, LISTing a BASIC program, or downloading a message over a modem, when a critical line scrolls off the top of the screen, never to be seen again? Backscr is a user-supported, co-resident program which saves the text into a buffer as it scrolls off the screen. The host program can be frozen at any time by hitting the control key and space bar at the same time. Backscr will then allow the user to scroll back through the buffer a screen or a line at a time.

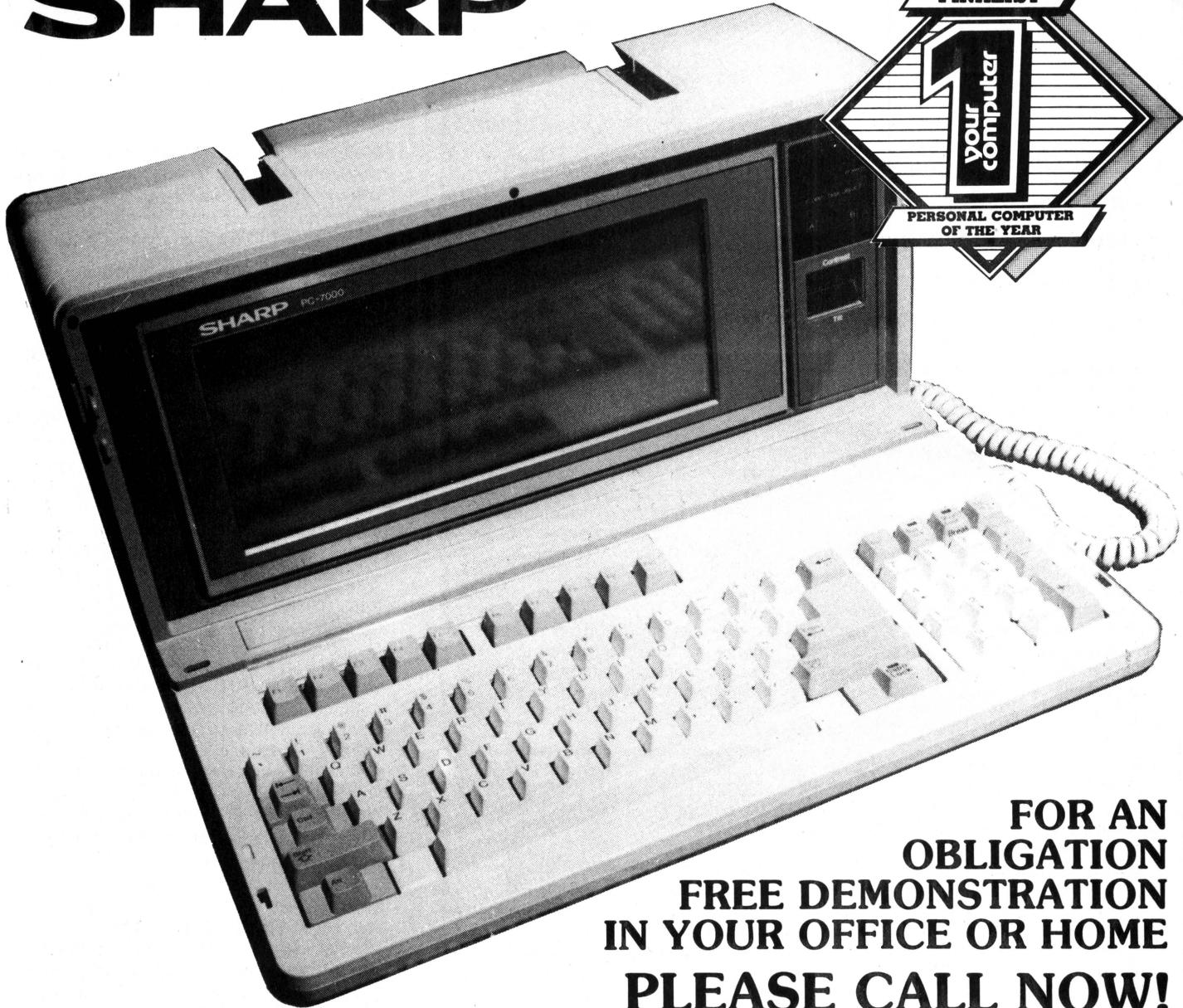
Backscr is installed by typing BACKSCR at the DOS prompt. A default buffer size of four screens can be changed to any number from 1 to 28 screens at installation. Backscr does use up a certain amount of memory — a few Kbytes for the program itself and approximately 2 Kbytes for each screen allowed for in the buffer. Approximately 15 Kbytes is required to use the default four screens, while just over 60 Kbytes is required if the maximum 28 screens are to be used.

A block of text within the buffer can be marked with the grey plus and minus keys at the extreme right-hand side of the IBM keyboard, and the block will be printed on the printer attached to LPT1: when PrtScr is pressed. One of the useful features of Backscr is that a BASIC CLS statement saves the last screen to a buffer, so it can be re-inspected if desired. Pressing the space bar or Return toggles the machine from Backscr to the host program.

Backscr is user-supported software written by the Kampro Group, PO Box 90654, Honolulu, Hawaii 96835. The company asks for a donation of \$US20 from satisfied users — not bad value.

As always, a copy of the software mentioned in this column (except for block-busters like PC-File and PC-Write) can be found on the Sydney PC Users' Group Bulletin Board, (02) 238 9034. □

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CLUBFILE

One of the best places to get information and help with a particular machine is through a computer user group or club. Such little pockets of wisdom are scattered throughout Australia, as you can see from our listing ...

Australian Capital Territory

ACT PC Users' Group, Nick Hammond, PO Box 188, Parkes 2600. Meetings last Monday each month at Reid Tafe, 8.00 onwards. (062) 86 1102.

ACT VIC-20 Users' Association, Chris Groenhout, 25 Kerferd St, Watson 2602. Meetings first Monday each month at Boys' Grammar Scout Hall, Red Hill, 7.30 onwards. (062) 41 2316.

Albury Wodonga Apple User's Group, Jenny Scott (secretary), (060) 24 3225 or Don McLennan (president), (060) 46 028; meets second Wednesday every month at Wodonga High School at 7.30 pm.

ATARI, Chris McEwan, co-ordinator, ACTARI, PO Box E112, Canberra 2600, (062) 88 7861.

Apple User Group (ACT), Jeff Brock, 1 Buckley Circuit, Kambah 2902, (062) 31 3630.

Australian ZX80 Users' Association (AZUA), David Vernon, 50 Waller Crescent, Campbell 2601; for ZX81, ZX Spectrum and Sinclair QL owners. Meets on the last Wednesday of every month at the Woden Valley High School library at 7.30 pm.

Canberra ACT Sirius User Group, Jim Bland, (062) 81 2824, (062) 81 2832.

Canberra Compucolor Club (CCC), Meets 7.30 on first Sunday of every month at the offices of Digital Equipment, 28 Lonsdale Street, Braddon ACT.

Canberra Microbee Users' Group, Meets 7.30pm on first Tues of every month at Woden Valley High School Library. Bill Horsfall (062) 58 3193. PO Box 227, Weston Creek, ATC 2611.

Canberra Micro-80 Users' Group, Harry Cooper, 113 Owen Dixon Drive, Evatt 2617; meetings 3rd Monday each month, 7.30 pm in the large theatre, 'I' Block, Reid TAFE, for System 80, TRS80 and similar. (062) 58 3700.

Canberra NEC Users' Group, Mal Smith, PO Box 173, Belconnen 2616; meets first Tuesday each month at Main Conference Room, CSIRO Headquarters, Limestone Avenue, at 7.30. (062) 54 1614.

Canberra Osborne Group, c/o Geoff Cohen, PO Box 136,

Kippax 2615, (062) 54 7608.

IBM User Group, Ron Pollack (president), PO Box 501, Sydney 2001; meets third

Monday of every month on the 11th floor, 50 Bridge Street, Sydney in the Price-Waterhouse seminar rooms at 5.30 pm. (02) 290 3655.

Kaypro User's Group (ACTKUG), meets on the third Thursday of each month from 6.30 pm in the I Block theatre, Canberra TAFE, Constitution Avenue, Reid. Contact Des Ireland, on (062) 47 5330.

Micsig, Registrar, PO Box 446, Canberra 2601.

PC Users' Group (for users of IBM PC and similar machines); meets on the last Monday of each month at 8 pm in the main theatre, Building I, Canberra TAFE. Contact address: PO Box E188, Parkes, ACT 2600.

Sirius/Apricot User Group, M J Sim, 253 Hindmarsh Drive, Rivett 2611; meetings 7.30 pm third Tuesday each month, 88 Wollongong Street, Fyshwick 2609.

New South Wales

Albury-Wodonga District Microbee User Group, Eric Eulensteiner, 202 Kooba St, Albury 2640, (060) 25 1601.

APF Users' Group, Norm McMahon, 288 Kissing Point Road, Turramurra 2074, (02) 44 2645.

Apple Team Australia, 5 Walpole Place, Wahroonga 2076; (02) 48 1018.

Apple Users' Disk Exchange Club, Phillip Donnadieu, Flat 1 8-10 Lancelot Street, Allawah 2218; (02) 579 4547.

Apple Users' Group, Colin Rutherford, PO Box 505, Bankstown 2200; meets 6.30 pm second Monday of each month (Tuesday after public holidays) at Sydney Grammar School, Stanley Street, Sydney. (02) 520 0926.

Atari Computer Enthusiasts, Tony Reeve, PO Box 4514, Sydney 2001.

Ausborne, The Secretary, PO Box C530 Clarence Street, Sydney 2001; meetings third Wednesday each month at 6.30 pm in the North Shore Council Chambers, Cnr Miller and McLaren Streets, North Sydney 2060. (02) 95 5378.

Ausbug, Stephen Ford, PO Box 62, Londonderry 2753.

Bankstown-Fairfield Computer Group, Arthur Pittard, 36 Hubert Street, Fairfield

2165; meets 4th Wednesday of the month at Canley Vale High School, Prospect Road, Canley Vale at 7 pm, (02) 72 2881.

BEDBUG, Chris Fallshaw, Eltham College.

Blue Mountains Microbee User Group,

Roger Cooper (president), (047) 58 7238.

Blue Mountains Homebrew Computer User's Group, Eric Lindsay (secretary), 25 Reserve Avenue, Blaxland 2774, (047) 51 2632.

Bondwell User's Group, Ray Richards, 7/39 Ross Street, North Parramatta 2151, (02) 683 3940.

Broken Hill Microbee Users' Group, Peter Cotter, 533 Radium Street, Broken Hill 2880, (080) 88 1621.

Casio PB 700 User Group, Terry Gill, 27 Greenleaf Street, Wentworthville 2145, (02) 636 1652.

Central Coast Apple Users' Group, Charles Lee, (043) 67 6845 or Mick Tierney, (043) 41 9350. Meets first Tuesday each month at the Central Coast Grammar School, Erina Heights from 7.30 pm. (043) 84 3419.

Central Coast Microbee Club, Max Maughen, PO Box 36, Ettalong Beach 2257, first Tuesday every month at Applied Technology, West Gosford. (043) 24 2711.

Compucolor Users' Group, Tony Lee, 52 Cowan Road, St. Ives 2075, phone (02) 449 8824.

Cooma Microbee User Group, Phil Zikan, PO Box 92 Cooma 2630, (064) 82 3315; meets on the second Friday of the month.

Cumberland Computer User Group, S O'Neil, (02) 682 3851.

Dataflex User Group, Roger Walker, (02) 699 3877.

dBase Users' Group, PO Box 297, Neutral Bay Junction 2089; meets every second Tuesday each month at the Cowper Room, St. Andrew's House, corner Bathurst and Kent Sts, Sydney.

DEC Personal Computer Special Interest Group, Marion Rhydderch, DEC Australia, Northern Tower, Chatswood Plaza, Railway Street, Chatswood 2067, (02) 412 5252.

Dubbo and District Microbee Users' Group, Coralie Taylor, 18 Cunningham Street, Dubbo 2830; meets fourth Wednesday each month at 7.30 pm in the Dubbo High School Computer Room.

Griffith Computer Association, Ron Gauci, PO Box 425, Griffith 2680, (069) 62 5877. **Griffith Microbee User's Group**, Ingmar Meins, (069) 62 3074; meets the fourth Monday of each month at Neighbourhood House at 7.30 pm.

Hawkesbury Apple User Group, Secretary Steve Bennett; meets fourth Monday each month at 7.30 pm, Richmond Primary School, (045) 78 2195.

Hawkesbury Commodore Computer Club, Richard Farrell, 12 Inverary Drive, Kurmond 2757; meets fourth Tuesday of each month at 7.30 pm at Neighbourhood Centre, West Market Street, Richmond 2753.

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SM870	SmartModem AD, AA, AX, AI, ASY 1200A	1200 FDX, 300 FDX (V22, Bell 103)	
SM872	SmartModem AD, AA, AX, AI, SY/ASY 1200SA	1200 FDX, 300 FDX (V22, Bell 212A, Bell 103)	
SM880	SmartModem AD, AA, AX, AI, ASY 2400A	2400 FDX, T200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103)	
SM882	SmartModem AD, AA, AX, AI, SY/ASY 2400SA	2400 FDX, T200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103)	
SM840	SmartModem AD, AA, AX, AI, AR, ASY 123A	1200 FDX, T200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103)	
SM842	SmartModem AD, AA, AX, AI, AR, SY/ASY 123SA	1200 FDX, T200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103)	
SM845	SmartModem AD, AA, AX, AI, AR, ASY 1234A	2400 FDX, T200 FDX, 1200/75 FDX, 300 FDX V22bis, V22, V23, V21, Bell 212A, Bell 103	
SM847	SmartModem AD, AA, AX, AI, AR, SY/ASY 1234SA	2400 FDX, T200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103)	
SM891	SmartModem AD, AA, AX, AI, SY/ASY 21/23SA	300 FDX, T200/75 FDX (V21, V23, Bell 103)	
IN610	PC In/Modem FI, AD, AA, AX, AI, ASY	300 FDX, T200/75 FDX (V21, V23, Bell 103)	
IN610	1200 In/Modem FI, AD, AA, AX, AI, ASY	1200 FDX, 300 FDX (V22, Bell 103)	
IN615	2400 In/Modem FI, AD, AA, AX, AI, ASY	2400 FDX, T200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103)	
IN620	123 In/Modem FI, AD, AA, AX, AI, AR, ASY	1200 FDX, T200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103)	
IN625	1234 In/Modem FI, AD, AA, AX, AI, AR, ASY	2400 FDX, T200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103)	
TR100	TrailBlazer 10,000 bps Packetised Ensemble Modem; AD, AA, AD, AT, AR, ASY, EC, 2 wire PSTN	High Speed, 1200 FXX, 300 FDX (Adaptive Duplex, Bell 212A, Bell 103)	
TR200	TrailBlazer PC FI, as above	As above	

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Hawkesbury Microbee Computer Club, Bruce Rennie, 6 Warks Road, Kurrajong Heights 2758; workshops 7.00 pm third Friday, and general meetings 7.30 pm first Friday of each month in the Microbee Network Room, Library Building, Richmond High School, Cnr Penrith and Lennox Streets, Richmond 2753. (045) 67 7329.

Hitachi/6809 User Group, meets on the first Saturday of each month, at 2 pm; contact Robert Lohr on (02) 662 4150, after 6 pm for locations.

HP Desktop Computer Users' Group, Dr R W Harris, CSIRO Division of Mineral Physics, PMB 7, Sutherland 2232, (02) 543 3460.

Hunter Users' Group — All Microcomputers, Secretary, PO Box 39, Broadmeadow 2298; meets on the second Wednesday of each month in Room 308, Building W, University of Newcastle, at 7.45 pm. Membership is primarily Apple II oriented, but anyone with interest in micros welcome.

Illawarra Apple Core Secretary, Chris Haley (042) 71 2238. Meets at 8 pm in the library of the Holy Spirit College Bellambi on the 4th Monday of each month.

Illawarra IBM PC Club — All IBM compatibles, Dick Adams (secretary), c/o John Lysaght Ltd, Delivery Code 29, PO Box 77, Port Kembla 2505; (042) 75 6721.

Illawarra Microbee Computer Club, Ronald Read, PO Box 271, Warrawond 2502; meets

every 4th Monday at 7.30 pm, Wollongong Institute of Education, Northfield Ave, Gwynneville; (042) 71 2384.

Illawarra Super 80 Users' Group, Jim O'Grady, Chairman, PO Box 1775, Wollongong 2500.

Macarthur Computer Association, J Napier, 23 Athel Tree Crescent, Bradbury 2560; meets first Monday each month at Airds High School, Briar Road, Campbelltown 2560, at 7.30 pm each month; all machines are catered for. (046) 25 2055.

Macquarie Microbee Users' Group, Brian Thompson; meetings first Monday each month at Denistone East Primary School at 7.30 pm. (02) 85 1659 after hours.

Macwest Users' Group, PJ Lynden, 11 Toohey Ave., Westmead 2145; Services will include newsletter, bulletin board and public domain library. Membership \$10 pa. **MEGS (Microcomputer Enthusiasts' Group)**, John Whitlock, PO Box 1309, Chatswood 2067; meetings third Monday each month at rear of St Andrew's Presbyterian Church, 37 Anderson Street, Chatswood 2067, (02) 638 1142.

Microbee Users' Club (Broken Hill), Peter Cotter, 533 Radium Street, Broken Hill 2880, (080) 88 1621.

Newcastle Microbee Users' Group, Lee Osman, 12 Clevertown Close, Warners Bay 2282, (049) 48 8813.

Newcastle Microcomputer Club, Angus Bliss, PO Box 293, Hamilton 2303; meetings 7.30 pm second and fourth Monday each month at Room G12, Physics Building, Newcastle Uni. (049) 67 2433.

NSW Primary School Microbee Users' Group, Mr Peter Stretton, c/- Hunters Hill Primary School, Alexandra Street, Hunters Hill 2110.

NSW 6800 Users' Group, 27 Georgina Avenue, Keiraville 2500.

Northern Beaches VIC User Group, E. Tuxford, 161 Barrenjoey Road, Newport 2106, (02) 997 2467.

Northern NSW MICC Chapter, Alen Hartley, Dundurrabin via Dorrigo 2433, (066) 57 8160.

Open Access User Group, Steve Cook, Advanced Data Technology Pty Ltd, 1 Terrell Avenue, Wahroonga 2076; (02) 48 0511.

OSI Users' Group, Nigel Bisset, (02) 411 7142.

Ozbeeb User Group for the Acorn BBC Microcomputer, Meets twice a month at the Australian Film & Television School — Open Program, 3 Lyon Park Road, North Ryde — 2nd Wednesday of every month at 7 pm (organised talks and demonstrations); 4th Monday of each month at 6.30 pm (general meeting). Annual subscription for full membership \$10.

Pocket Computer Users' Club, George Antonijevic; for those interested in pocket

computers, whatever the brand. Meetings held on the first Wednesday of each month at 7.30 pm at the Woodstock Community Centre, Church St, Burwood 2134, (02) 683 4296.

Sega Users' Club, Jim Robinson — Penrith branch, (047) 30 1834; Jeff Wilson — Parramatta branch, (02) 684 4128.

Sirius/Apricot User Group, Wayne Collom, Barson Computers; meets first Tuesday each month at 6.30 pm, Unit D, 55 Talavera Road, North Ryde 2113, (02) 888 9444.

Sorcerer Users' Group, PO Box E162, St James 2000; meetings third Friday each month at 8.00 pm in Greenwich Community Hall, Greenwich Road, Greenwich 2065.

Southern Districts Commodore Users' Group, Lex Toms, 3 Lucille Crescent, Casula 2170; meetings first and third Wednesdays each month, API Hall, Currajong Road, Prestons 2170. (02) 602 8691.

Sutherland Super 80 Group, Jim Traeger, (02) 525 2018.

Sydcom 64 (C64 User Group), Philip Dean, GPO Box 1542, Sydney 2001; meets on the second Wednesday of each month at the Abraham Mott Hall, Argyle Place, Miller's Point.

Sydney Forth Group, Peter Tregeagle, 10 Bindia Road, Yowie Bay 2228; meets second Friday of each month at 7.00 pm in the John Goodsell Building, UNSW room LG19. (02) 524 7490.

Sydney Kaypro Users' Group, Hans Schneider, C/O Dr H. Schneider, Geography Department, UNSW, PO Box 1, Kensington 2003; meetings second Tuesday of each month, 8.00 pm, Burwood RSL Club. (02) 697 4400 (w) or (02) 309 2961 (h).

Sydney Lotus 1-2-3 User Group, Ron Pollak, (02) 29 5316.

Sydney Microbee User Group, Ron Taylor (secretary), (043) 41 5251 after 7 pm; PO Box C233, Clarence St, Sydney 2000. Meets third Saturday each month from 1 to 4.30 pm, in the assembly hall of Strathfield Girls' High School, Albert Road, Strathfield, (02) 92 6408.

Sydney TRS80 Users' Group, meetings second, third and fourth Saturday of each month at Botany. (02) 666 4716 bh.

System 80/TRS-80 & Colour Computer Users' Group, Jim Fisher, 37 Fairburn Avenue, West Pennant Hills 2120.

TAG — The Access Group, Bob Dolton, PO Box 943, Orange 2800; for Access and Actrix users.

The Great Western Computer Users' Group Jim Graham, PO Box 210, Wentworthville 2145; (02) 636 9219. All micro users are welcome. A 40-minute beginner's session is held at the beginning of each meeting. The club meets on the first Tuesday of each month, at 8 pm.

The Morrow User Group Alan Stern, (02)

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750 8274; meets on the fourth Wednesday of every month at the Woodstock Community Centre, Church Street, Burwood at 7.30 pm.

Western Sydney PC and Compatible User Group, Ben Sharif, (047) 36 4825; meets on the third Sunday of the month at 1.30 pm, 27 Cosgrove Crescent, Kingswood 2750. **TI Sydney Home Computer Users' Group**, PO Box 149, Pennant Hills 2120.

Tuggerah Lakes Computer Users' Group, Frank James, 125 Woolana Avenue, Budgewoi 2262; meetings second Thursday each month at Old Primary School, Wyong, at 6.30 pm. (043) 907 339.

Wagga Microbee Users' Group, John Simmons, 47 Undurra Drive, Glenfield 2650; meetings first and third Tuesdays each month in the Tolland-Glenfield Neighbourhood Centre at 8.00 pm. (069) 31 1302.

Wizzard User Group, John Mifsod, 150 Bouganville Road, Blackett 2770, (02) 628 0801.

ZX-Spectrum Users' Club, Craig Kennedy, PO Box 466, Epping 2121.

Victoria

Albury Wodonga User's Group, Jenny Scott (secretary), (060) 24 3225 or Don McLennan (president) (060) 46 028; meets second Wednesday of every month at Wodonga High School at 7.30 pm.

Apple Users' Society of Melbourne, D Halprin, PO Box 43, Forest Hill 3131, (03) 387 3221.

Atari User Group Melbourne, Kelvin Eldridge, PO Box 173, Reservoir 3073.

Australian Forth Interest Group, Tony Latermore, PO Box 704, Sale 3850, (051) 44 2011.

Australian North Star Users' Association, PO Box 194, Wangaratta 3677.

Ballarat Computer Users' Group, Publicity Officer: John Preston, (053) 31 4363.

BBC Users' Group, Mr Howell (Secretary), 1 Washusen Road, Heathmont 3135, (03) 420 2611 (B). Meets last Wednesday each month from 7 to 9.30 pm at Copiquest, 423 Clarendon Street, South Melbourne 3205.

Billanook Computer Forum, Maurie Canterbury, Cardigan Road, Mooroolbark 3138, (03) 725 5388.

Chip 8, 6800, 1802 User Group, Frank Rees, 27 King Street, Boort 3537.

Compucolor Users' Group, L Ferguson, 12 Morphett Avenue, Ascot 3342.

DEC Personal Computer Special Interest Group, see NSW entry.

Essendon Commodore 64 User Group, George Stathoulis, 8 Byron Avenue, East Keilor 3033, (03) 337 4159.

Forth Interest Group, Lance Collins, PO Box 103, Camberwell 3124; meets on the first Friday of the month at the Bowen Street Neighbourhood Centre, 102 Bowen

Street, Camberwell South 3124. (03) 29 2600.

Geelong Commodore Computer Club, D Gerrard, 15 Jacaranda Place, Belmont 3216, (03) 44 2863.

Geelong Computer Club, Colin Lowne, PO Box 520, Geelong 3220; (052) 55 1232. Meets at 8 pm, on the first and third Friday of each month in the rooms of the Geelong Amateur Radio Club, Storrier Street, East Geelong.

IBM & Columbia Computer Users' Club, Giles Bray, 22/11 Auburn Grove, Hawthorn East 3123; meets second Tuesday each month, 7.30 pm, at the Victorian College of Pharmacy, (03) 82 7632.

Kaypro Users' Group of Victoria, George Kunz, PO Box 159, Forest Hill 3131; meetings fourth Sunday each month at Burwood State College Community Resources Centre at 2 pm. (03) 857 5462. **KAOS (Ohio Scientific)**, David Anear, 49 Millewa Crescent, Dallas 3047.

Latrobe Valley Colour Computer Users' Group, George Francis, 31 Donald Street, Morwell 3840; for TRS80 and MC10 users. (03) 22 1389.

Melbourne Atari Computer Enthusiasts, PO Box 340, Rosanna 3084; meetings held on second Sunday of each month (except January) at 12 noon at Monash University Rotunda.

Melbourne BBC Users' Group, Meets last Wednesday in the month at Conquest P/L, 423 Clarendon Street, South Melbourne. Ring the secretary on (03) 729 4619 (AH).

Melbourne Lotus 1-2-3 Users' Group, Robert Taylor, (03) 267 4800.

Melbourne Microbee Users' Group (MBUG Australia Inc.), President: Grant Forrest, PO Box 157, Nunawading 3131; meets at 7.30 pm on the second Wednesday of each month at Mount Waverley Community Centre, Cnr Miller Crescent and Stephenson's Road, Mount Waverley.

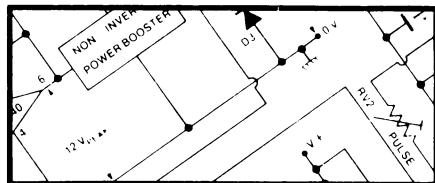
Different types of membership, including country, bulletin board, city, and student. **Melbourne PC User Group — IBM and compatibles**, The Secretary, c/o Pannell Kerr Foster, 14th Floor, 500 Bourke Street, Melbourne 3000, (03) 830 5067 between 6 & 8 pm; meets the second Wednesday of each month at 6 pm in the ground floor auditorium, Clunies Ross House, 191 Royal Parade, Parkville.

Melbourne Hitachi Users' Group, Branko Colavizza, PO Box 191, Rosanna 3084, (03) 434 2541.

Melbourne Super 80 Users' Group, Hon. Sec. Victor Shuttleworth, (03) 723 2713.

MICOM (Microcomputer Club of Melbourne), PO Box 60, Canterbury 3126.

National Mutual Micro Users' Group, R Prewett, NMLA, PO Box 2830AA, GPO Melbourne 3001; for National Mutual staff. **National Sinclair User Group**, PO Box 148, Glen Waverley 3150.



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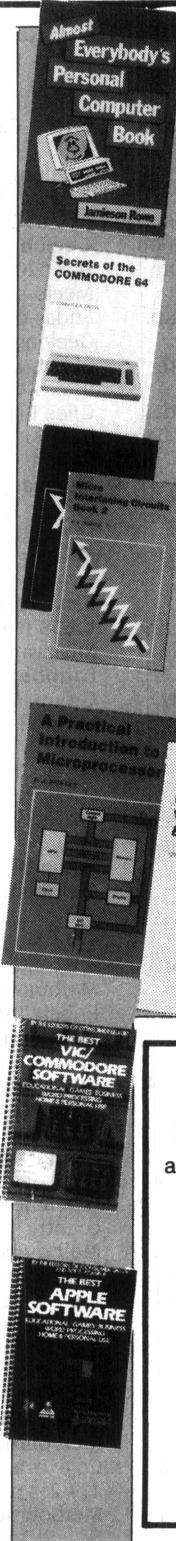
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Northern/Western Suburbs Computer Users' Group, John King (Secretary), 284 Union Road, Moonee Ponds 3039. Contact CP/M Data Systems, (03) 338 9304.

Peninsula Computer Club, George Thompson, 3 Patterson Street, Bonbeach 3196; meets second Tuesday each month at Chisholm College, Frankston 3199; many types of computers catered for. (03) 772 2674.

Sega Users' Club, Peter Lindeman, 6 Bay Street, Port Melbourne 3207.

Seymour-Pucka Computer Club, Garry Sutton, 25 Malaya Road, Puckapunyal 3662; (057) 93 1091.

Sharp Computer Users' Association, The President, 7 Faye Street, East Burwood 3151.

Spectravideo Users' Group, Mitch Raitt, 3 Clivejay Street, Glen Waverley 3150, (03) 233 2357.

Sorcerer Computer Users' (Australia), Secretary, GPO Box 2402, Melbourne 3001. TI-99/4A Users' Group Melbourne, Wayne

Worlidge, 123 Ashburn Grove, Ashburton 3147, (03) 25 1832.

The Motorola User Group (MUGS), Clive Allan, 11 Haros Avenue, Nunawading 3131; group is interested in 6800/02/09-based computers, particularly if running Flex, although this is not a prerequisite to join. (03) 878 1298.

Upper Yarra Computer Reference Group, for microcomputer enthusiasts and educators. Contact Albin Wallace, Woori Yallock Education Centre, (059) 64 6617. **Victorian Association of Computer Educators**, Arthur Totrall, PO Box 69, Whittlesea 3757.

Victorian Osborne Users' Group, Bill Baker, PO Box 169, Camberwell 3124, (03) 850 4187.

Victorian VZ-200 User Group, Luigi Chiodo, 24 Don St, Reservoir 3073, (03) 460 3770.

Victorian Wizzard Users' Group, Barry Klein, 24 Russell Street, Bulleen 3105, (03) 850 7275.

Wizzard User Group, for owners of Dick Smith Wizzard and Funvision computers. The group operates only by mail and phone at present. Contact Barry Klein, 24

Russell Street, Bulleen 3105, (03) 850 7275.

Yarra Valley Commodore User's Group — affiliated with the Melbourne Central Commodore User's Group, Barrie Vickers (secretary), PO Box 176, Lilydale 3140, (03) 735 0638; meets on the first Tuesday of each month at the Melba Hall, Cnr Market & Castella Streets, Lilydale at 8 pm.

Yarrawonga Computer User Group, Chris Younger, 10 Witt Street, Yarrawonga 3730, (057) 44 385; for all machines.

ZX81 Software Exchange, c/- Chips Taens, 5 Muir Street, Mount Waverley 3149.

Queensland

Adventure Club, Christine Ogden, 37 Samford Road, Leichhardt, Ipswich 4305; for all Adventure-type game players.

Adventure News, Stuart Elflett, MSF 550, Toogoolawah 4313. For Coomodore 64 adventures only.

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Amstrad Postal Users' Group, Frank Elliot, 59 27th Avenue, Palm Beach 4221; a group for isolated Amstrad users — meets monthly by cassette.

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Apple-Q — The Brisbane User Group, The Secretary, PO Box 721, South Brisbane 4101; meetings every third Sunday of month at Hooper Education Centre, Kuran Street, Wavell Heights 4012. Centre is open from 8.30 am till 4.30 pm; members encouraged to bring Apple along.

Australian Sirius Users' Group, PO Box 204, Chermside 4032; looks after the needs of Sirius One and Victor 9000 computer users; (07) 350 2611.

BASIC User Group, Chris Lucey, Cranium Computers, 34 Lawless Street, Blackwater 4717.

Brisbane Medfly Users' Group, K J Walker, 120 Highgate Street, Coopers Plains 4108. **Brisbane Sinclair (Spectrum) Computer Club**, V Lewis, 37 Samford Road, Ipswich 4305; meets third Sunday at Everton Park High School, at 2.00 pm. (07) 355 7809.

Brisbane Super 80 Users' Group, Gary Gatfield, (07) 355 3173.

Brisbane Youth Computer Group, A Harrison, PO Box 396, Sunnybank 4109.

Brisbug, Roy Willie (Secretary), PO Box 305, Wynnum Central 4178. Meets at 2 pm on the 3rd Sunday of each month at the Toowong High School. (07) 393 3388.

Cairns District Microbee Users' Group, Chas Eustance, 21 Marr Street, Edmonton 4869, (07) 55 4531.

Commodore Computer Users' Group, Mr NR Chambers, PO Box 274, Springwood 4127, (07) 808 2125.

Computer Owners' Group, Betty Adcock, 42 Lucan Ave, Aspley 4034; meets second Wednesday each month, 7.45 pm; all kinds of computers are catered for. (07) 263 4268.

Darling Downs Apple Users' Group, Lloyd, PO Box 53, Darling Heights 4350. (07) 38 3060.

DEC Personal Computer Special Interest Group, see NSW entry.

Gold Coast Microbee User Group, Col McLaren, 1/100 Imperial Parade, Labrador 4215; meetings first Sunday each month, 3.00 pm, at the Southport High School. (07) 31 4610.

IREE Microcomputer Interest Group, N Wilson, PO Box 811, Albion 4010.

Mackay Microbee User Group, Geoff Gehring, PO Box 230, Mackay 4740, (079) 42 3214.

MSX-Australia, PO Box 1319, Southport 4215.

Osborne Users' Group of Queensland Uni, Glen McBride; meetings second Wednesday each month, open to all. (07) 870 1177.

PC-8000 Users' Group of Queensland, David Clark, (07) 343 7680 (AH); Meets 2nd Friday of each month at the Old Town Hall, South Brisbane.

QBUG (Queensland BBC Users' Group), Meets 1st Tuesday each month. Ring (07) 386 022 (AH) for details.

Queensland CP/M Users, The Secretary, PO Box 1025, Milton 4064; meets on the last Sunday of each month at the University of Qld, Civil Engineering Room 1.01 (off Staff House Road) from 1 pm.

Sega Users' Group, Robert Horkings, PO Box 148, Fortitude Valley 4006, (07) 52 5603; meetings first Saturday of each month, YMCA Hall at 1 pm.

Southport Commodore Computer Users Group, Bill Fitzpatrick, PO Box 790, Southport 4125, (075) 32 0061.

Superboard Users' Group, Ed Richardson, 146 York Street, Nundah 4012.

Tandy, Apple, Commodore User Group, Chris Lucey, 34 Lawless Street, Blackwater 4717.

The Microcomputer Society, The Secretary, PO Box 580, Fortitude Valley 4006; meetings are held on the second Friday of each month in the Old Town Hall, corner Vulture and Graham Streets, South Brisbane 4101. Meetings start at 7.30 pm; if main gate is closed use the back stairway.

Townsville Microbee User Group (TMUG), Mannie Van Rijswijk, PO Box 5751 MC, Townsville 4810; meetings 7.30 pm on second and fourth Mondays each month on the Ground Floor, St Margaret Mary's Secondary School, Crowle Street, Hermit Park 4812.

TRS80/System 80 Computer Group, Secretary, 16 Laver Street, Macgregor 4109; meets first Sunday each month at Lindum Hall, Lindum Street, Lindum 4178, at 2.00 pm. (07) 343 5771.

University of Queensland Osborne User's Group, Glen McBride (president) (07) 870 1177, or Richard Duczmal (treasurer) (07) 377 3139; meets on the second Wednesday of the month, in the Axon building on campus. Membership is open to both students and non-students.

VZ-220/300 Computer Club, Michael Novakovic, 24 Albert Street, Goodna 4300. Phone (07) 288 3045 between 3.20 pm and 8 pm.

VZ-200 Pacific Region Club, J D'Alton, 39 Agnes Street, Toowong 4066, (07) 371 3707. **ZX81 Club**, P Carswell, 22 Braud Street, Bundaberg 4670.

South Australia

Adelaide Atari Computer Club (AACC), Secretary, PO Box 333, Norwood 5067; meets at Gilles Street Primary School, City, on first Monday (second if first is on public holiday) of each month, 7.30 — 9.30 pm.

Adelaide Beebnet, Contact the secretary at PO Box 262, Kingswood, SA.

Adelaide Lotus 1-2-3 User Group, Paul Wragg, Pannell Kerr Foster, GPO Box 1969, Adelaide 5001.

Adelaide Micro User Group, Helen Ross,

36 Sturt Street, Adelaide 5000; for TRS80 and System 80 users.

Adelaide Osborne Group, Russell Barter, The Secretary, GPO Box 603, Adelaide 5001.

Adelaide Sega User's Group, Jamie Andersen, (08) 263 5020 (after 4 pm); meets on the first and third Wednesdays of the month, from 7 pm, at the Lutheran church hall, 137 Archer Street, North Adelaide.

Adelaide Super-80 User's Group, Mr L White, The Secretary, 503 Churchill Road, Kilburn 5084; meets on the third Monday of each month, (the second Monday in the case of a public holiday) at 7.30 pm in the canteen of Mason & Cox Foundry, 123 Hayward Avenue, Torrensville 5031, (08) 260 6226. Subscription: \$5 pa.

Aquarius Users' Club, Benedict Sabel, 7 Duncraig Lane, 5152. \$5 membership fee covers the cost of a bimonthly newsletter.

Beebnet, BBC and Econet User Group PO Box 262, Kingswood 5062; the group intends to produce a newsletter on a monthly basis. It is interested in any software producers or distributors who would be interested in serving the group's market requirements.

Commodore/VIC Computer Users' Association, Mr Eddie Hann, 13 Miranda Road, Paralowie 5108; the SA branch meets monthly.

Compucolor-Intecolor Users of South Australia, PO Box 86, Torrensville 5031, (08) 352 3296.

DEC Personal Computer Special Interest Group, see NSW entry.

IBM-PC South Australia Users' Group, PO Box 68, Walkerville 5081.

Kaypro User Group, Ralf Engler, 16/34 John Street, Payneham 5070.

Microbee Users' Group of South Australia (MUGSA), The Secretary, GPO Box 767, Adelaide 5001.

Sega Users' Club, H.A. Jacobson, 10 Pioneer Avenue, O'Sullivan Beach 5166; (08) 382 7967.

South Australian Apple Users' Club, I.H. Bagust, c/o The Bookshelf, 169 Pirie Street, Adelaide 5000, (08) 293 7183; meets on the first Friday of each month in the Prospect Town Hall.

South Australian Commodore Computers' User Group, Eddie Hann, Secretary, PO Box 427, North Adelaide 5006; meetings second Tuesday each month, 7.30 pm, at Royal Caledonian Hall, 379 King William St, Adelaide 5000. (08) 258 6367.

South Australian Foundation for Computer Literacy, Michael Kennett, PO Box 210, Norwood 5067; caters for children from six years (unaccompanied) or four years with older friend or brother or sister. Special emphasis on the needs of handicapped, educably disabled and socially disadvantaged children, but

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all children welcome. Family participation encouraged. Phone (08) 51 5474.

South Australian Peach User Group, Geoff Drury, 27 Creslin Tce, Camden Park 5038; special interest group attached to the SA Microprocessor Group, which holds separate meetings; (08) 295 2778 ah.

South Australian Microprocessor Group Inc (SAMG), The Secretary, PO Box 113, Plympton 5038, (08) 278 7288.

Sorcerer Users' Group of South Australia, Don Ide, 14 Scott Road, Newton 5074.

South Australian Apple Users' Club, The Secretary, c/- The Bookshelf, 169 Pirie Street, Adelaide 5000.

South Australian Microprocessor Group Inc (SAMG), secretary Rick Matthews, 9 Anglesey Ave, St Georges 5064; (08) 79 3445; meets second Friday of every month, Institute of Engineers, Aust Bldg, 11 Bagget St, North Adelaide.

South East Computer Enthusiasts' Group, Glenn Mibus, 3 Millard St, Mount Gambier 5290; meetings second and fourth Tuesday of each month from 6.30 pm at Mt Gambier High School Computer Room, for all machines and interested parties. (087) 25 1046.

Northern Territory

Alice Springs Microbee Users' Group, Douglas Craigie, c/- PO Box 3230, Alice Springs 5750.

Darwin Microbee Users' Group (BUG), Felino Molina, PO Box 3111, Darwin 5794, (089) 82 5613 bh, (089) 88 1455 ah.

Northern Territory Computer Club, Ian Diss: meets at Wulagi Primary School on the first and third Thursday of each month at 7.30 pm. Users of all machines and other interested parties welcome. (089) 27 9208.

Northern Territory 80 Computer User Group, R T O'Brien, 433 McMillans Road, Lingili 5792.

VZ-200 Users' Club, 7 Abbott Crescent, Malak 5793. (089) 27 2830.

Western Australia

Agriculture Users' Group, c/- Mr R Fenwick, Dept. of Agriculture, Albany 6330. For farmers and the agriculture service industries.

CU West WA Compucolor/Intecolor Users' Group, John Newman, 8 Hillcrest Drive, Darlington 6070.

DEC Personal Computer Special Interest Group, see NSW entry.

Domestic Apple Users' Group, Contact Todd Venning, 73 Sydenham Road, Doubleview 6018.

KAOS-WA, Gerry Ligtermoet, 39 Cloister Ave, Manning 6152; for Ohio Scientific Users. (09) 450 5081.

Kaypro User Group of Western Australia, Ainslie Sharpe, PO Box 91, Claremont 6010; meetings second and fourth Mondays of each month in the Canteen of the Department of Agriculture, Jarrah Road, South Perth 6151. (09) 384 5511.

Microbee Users' Group of Western Australia, The Secretary, 4 Garnkirk Road, Greenwood 6024, (09) 447 5366.

OSWEST-Osborne Users' Group of Western Australia, Mal Ferguson, PO Box 149, Applecross 6153; meets first and third Wednesdays at the Palmyra Recreation Centre and the Subiaco Exhibition Hall respectively from 7.30 pm, for Osborne and other interested computer users. (09) 295 1449.

Perth 80 Users' Group, C Powell; for System 80 and TRS80 users. (09) 457 6849.

Perth Hitachi Peach Club, The Secretary, 1 Charf Court, Riverton 6155; for Hitachi Peach and 6809s. (09) 367 5880.

Sharp PC Users' Group, John Paulic, PO Box 79, Gosnells 6110, (09) 398 6303.

Sega Users' Group, John McClemon, 33 Favell Way, Balga 6061; (09) 342 5905.

The Sorcerer & CP/M Users' of Australia, Dave, 22 Verbenia Road, Willetton 6155, (09) 457 1917. Meets every fortnight.

Sorcerer Computer Users of Australia, The Secretary, 90 King George Street, South Perth 6151, (09) 367 6351.

The West Australian Atari Computer Club, Mr Alf Gaebler (Secretary), PO Box 7169, Cloisters Square, Perth 6000.

The WA Cromenco Users' Group, CA Marshall, Suite 2, 294 Rokeby Road, Subiaco 6008. Meets third Tuesday each month. (09) 382 2692.

VIC-Ups, G. Padfield, (09) 451 4629.

Western Australian Wizzard Users' Group, John Reid, 13 Wenlock Road, Wattleup 6166, (09) 410 2359.

Western Australian ZX Users' Group, Phil Taylor, (09) 328 4111 bh.

Western Australian University Computer Club, 2nd Floor, University of WA, Guild Building, (09) 386 1455.

Tasmania

Apricot User's Group, Rick Snell, PO Box 286 C, GPO Hobart 7001, (002) 23 399926.

DEC Personal Computer Special Interest Group, see NSW entry.

Devonport Computer Interest Group, John Steveson, RSD 422, Sheffield 7306, (004) 92 3237.

Hobart Tasbeeb, Meets on the first Friday of the month at Rose Bay High School at 7.30 pm. Ring (002) 34 2704 for details.

Down Under Atari User Group; contact Robert Bronstein, 191 Rokeby Street, Howrah 7018.

Spectravideo Computer Users' Group, PO Box 191, Launceston South 7249; membership costs \$20, which entitles

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Tandy Hobart Users' Group, Ms KJ Rees, GPO Box 1271 N, Hobart 7001, (002) 72 1426; meets on the third Thursday of each month — contact Ms Rees for details of venue.

Tasbeeb, John Hannon, PO Box 25, North Hobart 7000; meetings first Monday each month at Elizabethan Matriculation College in D Block at 8 pm, for BBC computers. (002) 34 2704.

Tasmanian Apple Users Group, Ray Williams, PO Box 188, North Hobart 7008, meets third Tuesday each month at 8.15 pm, 73 Murray Street, Hobart.

Tasmanian TI User Group, Co-ordinator, 1 Benboyd Court, Rokeby 7019; meetings third Sunday of each month at University of Tasmania, room 373. (002) 29 4009.

TAS-Micro, Peter Deckert, 1/456 West Tamar Road, Riverside 7250.

New Zealand

Palmerston North Microbee Users' Group, Contact R. Anderson, 6 Hendon Place, Palmerston North, New Zealand.



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Stop those escapes!

In any of the 1-2-3 menus, pressing <Esc> will take you back one step at a time through the menu choices until you reach the ready mode. This will not necessarily work with menus you write using macros. Various solutions appeared in the November 26 and December 10 issues of the US edition of PC Magazine. In brief, the methods discussed are:

- Put a /XG command just below the cells that invoke menus and have an exit choice in each menu.
- Put a blank cell below the /XM command; pressing <Esc> will find this blank, terminate the macro and return to the ready mode.
- Keep menu texts in a separate column; include macro commands below the /XM commands which will execute if <Esc> is pressed.

Linear Regression with 1-2-3

Release 2 provides a command, /Data Regression, to provide simultaneous multiple regression analysis with up to 16 independent variables. It's possible to do linear regression on Release 1A, but it's very tedious to try to work out how.

Nevertheless, Lotus has indicated a way of graphing the results which works equally well with both versions. Here's how you do it.

Select the XY graph type. Assign the estimated Y values to both the X and A ranges, and the actual Y values to the B range. Set the format of the B range to symbols — /Graph Options Format B Symbols. The graph will show the regression line with the actual points scattered around the line.

Lotus says if you forget the password, you can't retrieve the file. It appears that when you use password protection, the whole file is encrypted, so it can't be read sector by sector as you might do with an ordinary 1-2-3 file. So, be careful!

File Protection with Release 2

Lotus says if you forget the password, you can't retrieve the file. It appears that when you use password protection, the whole file is encrypted, so it can't be read sector by sector as you might do with an ordinary 1-2-3 file. So, be careful!

Sparse Memory Management

Practically all spreadsheet makers are now turning to this system. The difference between it and the older method is that sparse memory management uses memory only for cells that have or have had entries in them, but does not allocate memory for blank cells — that is, those that have never had entries in them. By contrast, the older system allocates memory for all cells in the rectangle bordered by the top left and bottom right corners of the spreadsheet, even blank cells.

The bigger spreadsheets frequently have large blank areas to separate sections of the spreadsheet and make it easier to understand. This was wasteful of memory, and as spreadsheet users started to run out of memory the new system was adopted. However, this is turning out to be a mixed blessing. In cells that are in use the new system requires more memory than the old, so in a tightly packed spreadsheet the overall result is that more memory will be needed, not less. Moreover, the Release 2 program occupies substantially more space than Release 1A, so if you had trouble fitting a spreadsheet into Release 1A, you could still experience trouble with Release 2.

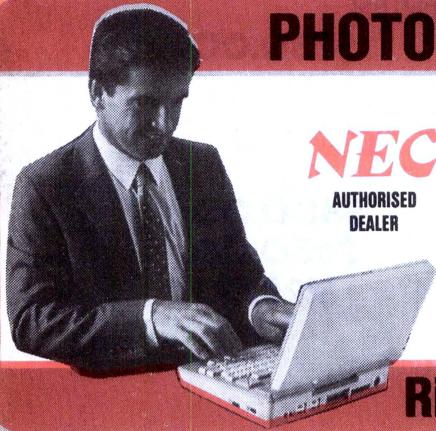
The Intel Aboveboard

Apparently some people have experienced problems when using Release 2 of 1-2-3 with extended memory boards such as the Intel Aboveboard. This problem manifests itself as excessively long load or save times. The problem becomes many times worse as the file size goes over about 160 Kbytes, and may also show up when loading a Release 1A file into Release 2 — but the Release 2 file may then be okay. In any case, some users have reported save times in Release 2 as being 20 per cent slower than in Release 1A.

Imagineering's suggestion for overcoming the problem is this:

1. Save a totally empty worksheet. For the sake of this example we'll call it BLANK.
2. Create an AUTO123 file containing a macro reading /FCCE BLANK~. Name this macro \0 (the Lotus manuals contain a full description of auto-loading worksheets and macros).

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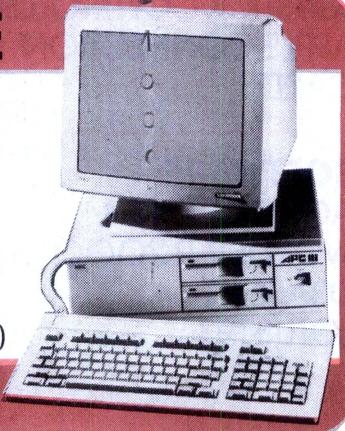


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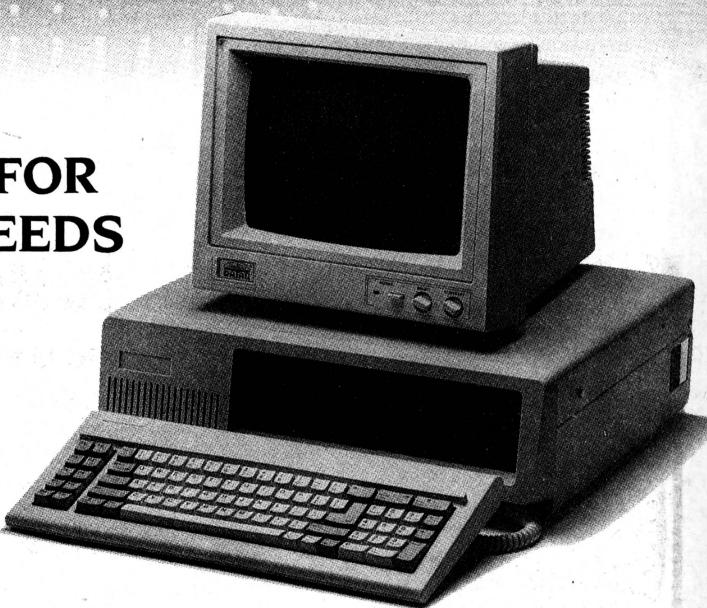
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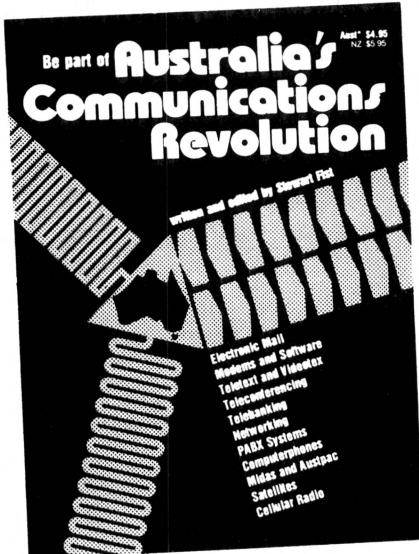
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This is a temporary fix; a better one from Lotus is expected.

Using the Aboveboard degrades the performance by about 5 per cent; this doesn't appear to change as you add extra memory to the board.

How to Help Others and Yourself

The problem mentioned above is a good example of how users can help to overcome difficulties. A number of people reported the problem to Imagineering's Lotus Hotline, and armed with this Imagineering was able to verify a problem existed and to ask Lotus to fix it (which it is doing). By contrast, a few users have experienced similar problems with Symphony 1.1, but only one or two have spoken to Imagineering about it, and the company has not yet been able to convince Lotus a problem exists.

Clearly we'll be better off if we tell Imagineering should we find any problems or shortcomings in 1-2-3, Symphony or Jazz. If enough people raise the same problem we have a good chance of getting it fixed. So if the occasion arises, please get as much detail as you can and give Imagineering a call or drop them a line.

Release 2 Again

You may be surprised to learn there are actually different versions of 1-2-3 Release 2; some of them work better than others. Look for the following points:

- Obtain a directory of the files. Most of them have the same creation date; if this is 9-12-85, that is September 12, 1985, you may experience problems. Other dates are all right.
- Look for the file 123.CNP. The file size should be 133848 bytes; others may give problems.
- If you try to put the system files on the utility disk and get a message saying there isn't enough room, check with Imagineering.
- If in translating files from Release 2 to Release 1A you get translation errors, or if in /FC figures don't zero out as they should, perhaps you need a new Translate disk.

Should you strike any problems like these, it would be worth your while to check with Imagineering, which will replace any disks with faulty programs.

Some users have reported that spreadsheets without complicated formulae are 15 to 20 per cent slower in Release 2 than in 1A. Adding an 8087 will speed up calculations by about 15 per cent, so the overall result will be about the same. With

A number of people reported a problem to Imagineering's Lotus Hotline, and armed with this Imagineering was able to verify the problem existed and to ask Lotus to fix it (which it is doing).

spreadsheets that have more complex formulae, the 8087 comes into its own and speeds calculations dramatically. However, the same doesn't apply to the 80286 used in the IBM AT; while the 80286 is faster than the 8088 and the disk drive is faster than the one in the XT, the addition of the 80287 won't produce a dramatic increase in speed — and in some cases may even be slower!

Imagineering

Imagineering publishes a technical newsletter which you can subscribe to for \$24 a year. I haven't seen it, but I understand most of it is devoted to the Lotus products. It may be worth looking at, although the price seems rather steep to me; shouldn't registered users receive it free as part of the 'Imagineering Club Membership'?

Colour

Users of Symphony 1.1 may be disappointed to see the screen still displays only three colours (including white) in graphs. This is the fault of IBM's colour graphics adapter; the new EGA (Extended Graphics Adapter) displays eight colours.

Updates

The recent update to Symphony (1.01 to 1.1) was handled through dealers, while the update of 1-2-3 was handled directly by Imagineering. An informal survey at a user group meeting has indicated overwhelming preference for the direct method. If you feel strongly one way or the other I'm sure Imagineering would like to hear from you.

Macros in Release 2

The manual contains the example {right 4} to instruct the program to move the cell pointer four cells to the right. To save typing you can shorten this to {r 4}. The same applies to left, up and down. □

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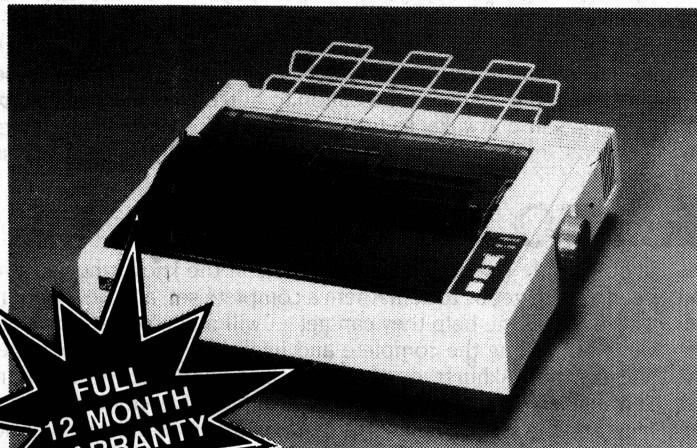
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Bang bang, peeyow peeyow, eh-eh-eh-eh-eh, pfft, BOOM, "stick 'em up". That's the sound of our May issue going off. Super shoot-out. Don't tell us you've forgotten or we'll blow yer head off — doesn't seem to be doing much good up there anyway.

As you may remember now, May is the fifth month of the year and part of the five-month build-up to our fifth birthday in July. Given these phenomena and the fact that you have five digits on your left hand and five toes on your right foot, I suppose you thought we'd be living up to our intention of publishing five major comparison stories — getting five products in each of five categories to shoot it out, so we can see how they rate, on a five-star scale, for performance, value for money, usability, design and support (five key points). Well, hold up them five digits o' yours... Peeyoww... Now you got four. That'll teach you to believe us. Nyuk, nyuk.

Fact is, we are going to do those things — kinda sorta. We are going to evaluate five products in each of five categories, but we're not exactly going to compare all of them, since that wouldn't be applicable in some cases.

First, we're going to look at the five newest AT-compatible machines on the market (they're popping up faster than ducks in a shoot-'em-down gallery). In this category, Matt is likely to search out the meanest performer, so he can arrange a duel between it and his favourite AT to date, the TI.

Then we'll take some printers apart and see what makes 'em good at bashing, spurtng or photo-imagerising our thoughts onto paper. So far we've got a cheapie dot matrix, a quality dot matrix, a daisywheel and a laser — and we're looking for something com-

pletely different to fill out the five. There's no contest here.

Fazed by FORTRAN? Our expert, Allan Miller, has used just about every version of the language you can name. In May he asks five of the newer compilers (Prospero, Ryan McFarland, IBM Professional, Microsoft and Lahey's F77) to step outside, and knocks off the not-so-goodies one by one. A single version of FORTRAN-77 restores his faith in the language and leaves him riding contentedly into the sunset.

For all those of you who want to fire things down the phone lines but are still fretting over the means, we'll present a line-up of the latest in long-distance artillery, or modems. No point trying to pick the best here either, though Matt's certain to have something definitive to say about what features all such devices should be offering.

Finally, we've taken some children hostage, in a bid to gain safe passage out of Federal (it's unlikely to be successful, since the kids are mostly Matt's), and in an effort to distract them from totally demolishing our food supply, we thought they might be well occupied in evaluating five of the cheapest machines we can find. Their aim? To come up with the best games computer.

Why are we sounding so mean all of a sudden? Well... shhhh, not so loud... let's just slip into my office for a moment... whoops, mind the canon. You see, this shootout is all a ruse. Sure we're doing the comparisons — you really are a suspicious bunch, aren't you? We had to have some excuse for having all these firearms lying around the office, and for the occasional loud noise when we practised using them — what better foil than an innocent little shootout?

THE FLIGHTING MACHINE

You see, we are escaping. We have a master plan and John Hepworth, who works in the Sydney County Council building next door, has been smuggling weapons to us through the IBM Underground. We've been having Combat for Birdwatchers sessions, in which we all wriggle around on the floor, propelling ourselves by our elbows and quickly rolling under desks and playing dead whenever a member of the management set strolls past. Matt got a spray can of Impulse with his Valentine's Day rose, so we've been improving our aim by lying at the office door and squirting passing ankles. Natalie has long been an expert with rubber bands; she's guaranteed to hit you in the eye at 20 paces — we should know, she's been maiming us for years. And you should see the damage Matt can do to a Coke can, firing ballpoint pens through a length of conduit — ink's poison, you know?

Structured Camouflage has also been a great success — why, sometimes our domain looks like a writhing jungle (or a special

screening of 'The Flowerpot Men') as we all wobble around trying to balance pot plants on our heads. We figure if we smear coffee grounds all over our faces, we'll look enough like an ESN print job to be able to move around the factory area unseen. Matt does a great impression of a guerilla (he's a furry face). So, warfare it is.

We'll load up our blunderbuss with nails and dynamite, and blast their barbed wire into a bird's nest, then we'll run through the hole in a burst of ratatatat from Damien's Rambo-style machine gun, peeyow peeyows (or pop pops) from Andrea's Magnum, bang bangs from Craig's Beretta, a cloud of pssst from Felicity's Brut 33 (well, we achieved a high mortality rate with the Impulse); and a flurry of ancillary rubber-band and poison-pen fire. We've programmed the Canon to hurl a bundle or two of Your Computers in our wake, to further bemuse the guards — but we'll be gone in the waiting Mattmobile, quicker than you can say XYZZY.

MAY WE VENTURE TO SUGGEST?

We don't think the May issue will be our parting shot; the show is bound to go on under more congenial conditions. So, in May, our in-anticipation-of-victory issue, you can also look forward to reviews of Paradox (a new database package, which some say might bump dBase off dMap), Javelin (a suitably warlike financial-analysis program), Pagemaker (a user-publishing-type package for the Mac — Natalie is going to play around with producing Your Computer on the run) and maybe the Amiga.

As long as we're celebrating, we thought we'd give you a super-special duper-double, giveaway freebee, blockbuster spectacular, something extra, doanmissout, starburst, starburst... thing. Old-faithful readers who are missing just one or two crucial, now-

unobtainable issues; frustrated people in the know who've never been able to get us to send them a complete set; and new readers, who need all the help they can get... will all be pleased to know we're publishing the complete and unabridged works of Les Bell and Brendan Akhurst, on the subject of BASIC for Birdwatchers. The first eight episodes will be presented as a bonus insert in May, and the second half of the carton will be handed over in June.

Not that the June issue needs any extra help. You'll all be doing the proverbial duck-jumping-on-bug thing when it hits the stands, because in it we're going to take the particularly fitting and timely opportunity to tell you how your friendly desktop can help you avoid, ummm, overpaying your tax.

Wish us luck.



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